

THE RELATIONSHIP BETWEEN
LANGUAGE SKILLS, SOCIAL COGNITION
AND EXTERNALISING BEHAVIOUR
IN PRIMARY SCHOOL AGED BOYS

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ABSTRACT

There is evidence of a high incidence of language difficulties (LD) amongst boys with externalising behaviour (EB); however we still have little understanding about *why* they co-occur. This 3 part study investigates aspects of this relationship framed within a biopsychosocial model and with a focus on pragmatic language skills and social cognition. Firstly, this study seeks to replicate recent research that has indicated a close association between pragmatic language skills and EB. It is the first study to consider the strength of this association while controlling for other variables known to commonly co-occur with LD and EB: aspects of the child's ability (word decoding and nonverbal cognitive skills), and aspect of their environment (parenting stress, maternal education and family set up). Secondly, this study furthers our understanding of the social cognitive and friendship skills of boys with LD, in both areas through investigating reasons for variance in ability. A better understanding of an LD population feeds into our understanding of EB due to the high proportion of boys with EB who have coexisting LD. Thirdly, this study measures social cognition of boys EB while accounting for the role of LD, thus investigating whether difficulty with these tests is associated with the high rate of LD in this population. Previous studies have not adequately considered this.

Method:

Boys aged 8 to 11 years receiving additional support in school were assessed for LD and EB and two groups (not mutually exclusive) were identified: boys with LD (n=31) and boys with EB (n=35). A control group of typically developing boys matched for age and SES were also identified (n=42). For part one, participants completed assessments of language skills, word decoding and non-verbal cognitive ability. Teachers completed a checklist to provide a measure of pragmatic language skills. Parents completed questionnaires to provide measures of parenting stress, family set-up and maternal education. For the second and third part of the study participants' social cognition was assessed and parent and teachers completed a checklist for measurement of emotional and behavioural difficulties including friendship skills.

Results and discussion:

In the first part of this study, all variables measured were found to be significantly associated with EB, as would be expected within a biopsychosocial model in which many factors interact with each other in the development of EB. However, particularly close associations were found between pragmatic language skills and EB (replicating previous research in this area), followed by language skills. This indicates a close and specific association between communication skills and EB, even when other closely associated variables are accounted for. In part two, amongst boys with LD, different social cognition assessments were found to be associated with different aspects of communication skills. One was most closely associated with structural (particularly expressive) language and the other two with pragmatic language. This indicates that they are tapping different constructs and highlights the difficulty using a proxy to give an indicator of social cognition; it is not easy to assess. Variability in friendship skills of boys with LD was not associated with any aspect of communication skills. Significant correlations were found with two of the social cognition test scores only. This is at variance with research indicating a link between friendship and receptive language skills. In part 3, the EB group scored significantly lower than the Control group in tests of social cognition, however EB

was not found to be linked with social cognition score. Only boys with LD (with or without EB) scored significantly lower than the Control group. This has implications for previous research into the social cognition of boys with EB which has not fully considered the high proportion with LD and the extent this may be contributing to their low social cognition scores. Implications for practice and future research are discussed.

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CHAPTER 1: INTRODUCTION AND TERMINOLOGY

1.1 INTRODUCTION

Government surveys indicate that as many as 20% of children will suffer some form of mental health issue at some point in their childhood or adolescence (Green, McGinty, Meltzer, Ford et al 2005). Furthermore cohort studies indicate an increasing trend over the past 25 years (Collieshaw, Maughan, Goodman & Pickles 2004). Reducing these high levels of mental health issues has been a target of government and educational policy (e.g. Scottish Executive, 2000; 2003; 2004). However it seems that such targets have had limited success as yet and ever-younger children presenting with these types of difficulties (Green et al 2005). There is evidence too that for some, mental health difficulties that develop in childhood persist into adulthood increasing risks for difficulties in social functioning and employment (Green et al 2005). For young people, their families and the wider society, the cost of child mental problems is high. We need to improve our understanding of the types of difficulties these children are presenting with in order to provide more effective early intervention.

1.1.1 An issue with communication?

Within the research literature it is well recognised that there is a high prevalence of language and communication difficulties amongst children with social, emotional and behavioural difficulties (SEBD), with estimates rates varying between 40 to 90 % (Benner, Nelson & Epstein 2002). This high level of co-existence has been recognised at least since the 1970s and early 1980s, notably in the work of Cantwell and Baker (Cantwell & Baker 1977; Cantwell & Baker 1980; Baker & Cantwell 1982). Since then a number of studies have reported this co-existence both in investigations of children primarily identified with a language difficulty (e.g. Baker & Cantwell 1987; Beitchman, Brownlie & Wilson 1996; Redmond & Rice 1998; Lindsay & Dockrell 2000; Beitchman, Wilson, Johnson, Atkinson et al 2001; Brownlie, Beitchman, Escobar, Young et al. 2004; Conti-Ramsden & Botting 2004;), and also in investigations of children primarily identified with a behaviour and/ or emotional difficulty (e.g. Cohen, Davine, Horodezky & Lipsett 1993; Cohen, Menna, Vallance, Barwick et al 1998a; Cohen, Barwick, Horodezky, Vallance et al 1998b; Nelson,

Benner & Chenney 2005; Ripley & Yuill 2005). However, despite considerable interest in this co-existence over the past few decades, we still know very little about *why* they co-occur, and aspects of this question will be considered in this thesis.

There are differences in how boys and girls present. Both language/ communication difficulties and SEBD are more common amongst boys than girls (Choudhury & Benasich 2003; Broomfield & Dodd 2004, National Statistics Online 2004; Green et al 2005). Boys are more likely to present with externalising behaviour (EB) (such as conduct disorders and hyperactivity disorders) whereas girls are more likely to present with internalising difficulties (such as depression and anxiety) (National Statistics Online 2004; Meltzer, Gatwood, Goodman & Ford 2003). Due to this higher prevalence and difference in presentation amongst boys, this thesis will focus on boys and EB.

The thesis has three main components. Firstly there will be an examination of factors that are recognised to be associated with EB, with investigations into the strength of their association with EB. The aim is to consider whether, when other factors known to be associated with EB are considered, the link between LD and EB is as strong a previous research suggests. Secondly there will be a focus on social cognition and friendship amongst boys with language difficulties (LD); due to the high incidence of LD amongst boys with EB this will inform our understanding here. Thirdly there is an investigation into the social cognition of boys with EB.

Participants in this study are in primary 4 to primary 7 in Scottish schools (aged between approximately 8 and 12 years old). This is an age when EB become more evident as academic and social expectations of school increase. Educational disengagement can start to become a serious problem associated with EB at this age and therefore intervention for these children is critical considering what we know about their potential long term negative outcomes (Hill, 2002). There is also evidence that, as noted above, though the incidence of EB is more pronounced in adolescence, it is on the increase in this younger age group (Green et al, 2005).

1.2 STRUCTURE OF THE THESIS

This thesis is composed of four main sections. The first three chapters provide a review of the literature in this area. The rest of this chapter discusses issues regarding diagnosis and classification of both SEBD and communication difficulties. Chapter 2 provides a consideration of what we know about the link between EB and LD and Chapter 3 focuses on social cognition in children with LD and EB. Chapter 4 is a short chapter that presents the research questions; these are split into three parts. The next section is the Methodology and this composes of one chapter split into three parts. In the first part methodological considerations regarding assessment selection are presented. The second part provides details of the data collection process, and the third part provides information about the statistical procedures used and the reasons for selecting these. The third section is the Results in which the statistical analysis of the data is presented, divided into three chapters. Finally there is the Discussion section which is split into five chapters. These discuss the research findings relative to previous research, followed by a discussion of the study methodology, implications for practice, areas for future research, and concluding comments.

1.2.1 Overview of chapter 1

Both communication /language difficulties and SEBD raise challenges for diagnosis and classification. This chapter will discuss the systems developed to classify SEBD and language/ communication difficulties, how they have evolved and the issues with these. As this study investigates structural and pragmatic language difficulties, these will be the focus of the discussion regarding the classification of communication difficulties. SEBD will be discussed generally, but with a focus on EB as this is specifically investigated in this study. This thesis has a focus on social cognition and therefore this will also be introduced in this chapter with a discussion on how the term has evolved and the definition that will be used in this study. Throughout the chapter terminology that will be used throughout the thesis will be introduced and discussed.

1.3 NOSOLOGY

Nosology is a term that refers to the process of delineating a disease entity (Rapin & Allen, 1983), which can be described as follows:

“Nosology can be viewed as a branch of taxonomy or classification. It refers to the descriptive, data gathering steps of inquiry, in which an attempt is made to identify clusters of symptoms and signs that will provide a basis for separating one condition from another. The strategy involves grouping individuals with reasonably homogeneous symptoms on the premise – not always correct – that the patients within these groups are likely to be suffering from the same “disease” and patients in different groups from different diseases.” (Rapin & Allen 1983, p156)

Being able to group people in this way is clearly desirable for research purposes, however in order to be workable, any classification system must be clear, reliable, broadly accepted and easy to use (Volkmar & Klin 2005). Developing a classification system that meets these three criteria is not straightforward, particularly for the presenting difficulties of interest in this thesis. Efforts to do so have therefore attracted some controversy. In the case of communication difficulties classification attempts have been relatively recent with one of the earliest in the 1980s (Rapin & Allen, 1983). Classification systems have changed considerably since then and are still evolving. Diagnostic stability is an important goal and difficulties arise if changes in diagnostic systems occur too rapidly, as interpretation of previous research becomes a problem (Volkmar & Klin, 2005). This is therefore an issue that we need to be aware of. In the case of SEBD (and also communication difficulties), there are issues around how much difficulties lie within the child or are socially constructed. Again, though more established than for communication difficulties, classification systems for SEBD are evolving and changing over time. These and other issues will now be discussed.

1.4 NOSOLOGY OF MENTAL HEALTH DISORDERS

There are currently two major classification (or nosological) systems for mental health disorders; the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-IV) produced by the American Psychiatric Association and the International Classification of Diseases (ICD-10) produced by the World Health Organisation. These systems have evolved over time and have increasingly converged in their

classifications so that they are now broadly comparable (Volkmar & Schwab-Stone 1996).

1.4.1 Mental health disorders in childhood (Social Emotional Behavioural Difficulties)

Both the ICD-10 and the DSM-IV make a distinction between mental health disorders identified in infancy, childhood or adolescence and those usually diagnosed in adults, though as stated in the most recent version of the DSM-IV, the DSM-IV-TR (2007) this is not to say that there is a clear distinction between “childhood” and “adult” disorders. Mental health disorders in childhood are frequently referred to as Emotional and Behavioural Difficulties or Disorders (EBD). This term recognises that children often present with behaviour that may be challenging due to an underlying emotional issue. More recently the term Social Emotional and Behavioural Difficulties (SEBD) has come into more common usage and acknowledges that the social circumstances of the child will potentially be playing a major role in presenting emotional and behavioural difficulties (Lloyd Bennett & van der Aalsvoort 2005). The term “disorder” adheres more to the medical model whereas “difficulty” is more frequently used in education settings. The term SEBD, referring to Social Emotional and Behavioural Difficulties will be used throughout this thesis.

SEBD can be separated out into “internalising” versus “externalising” difficulties (DSM-IV-TR, 2000). Internalising difficulties refer to emotional issues such as depression or anxiety. Externalising difficulties refer to the more overt challenging behaviours seen in diagnoses such as Conduct Disorder (CD), Oppositional Defiant Disorder (ODD) or Hyperactivity diagnoses such as Attention Deficit Hyperactivity Disorder (ADHD). It does not need to be a case of one or other; a child can have a combination of both internalising and externalising difficulties. The World Health Organisation’s International Classification of Diseases, tenth edition (ICD-10, 2007) recognises this in their classification of what they term “behavioural or emotional disorders with onset usually occurring in childhood or adolescence”. They classify such disorders as follows:

- Hyperkinetic disorders (which includes ADHD) which they define as “a lack of persistence in activities that require cognitive involvement, and a tendency

to move from one activity to another without completing any one, together with disorganized, ill-regulated, and excessive activity.”

- Conduct disorders (which includes ODD) which they state are characterized by “a repetitive and persistent pattern of dissocial, aggressive, or defiant conduct. Such behaviour should amount to major violations of age-appropriate social expectations; it should therefore be more severe than ordinary childish mischief or adolescent rebelliousness and should imply an enduring pattern of behaviour (six months or longer)”.
- Emotional disorders with onset specific to childhood, which they state are “mainly exaggerations of normal developmental trends rather than phenomena that are qualitatively abnormal in themselves. Developmental appropriateness is used as the key diagnostic feature in defining the difference between these emotional disorders, with onset specific to childhood, and the neurotic disorders”. This includes separation anxiety disorder, phobic anxiety disorder, social anxiety disorder
- Mixed disorders of conduct and emotions, defined as “a combination of persistently aggressive, dissocial or defiant behaviour with overt and marked symptoms of depression, anxiety or other emotional upsets”. Diagnostic criteria for both aspects of disorder must be met.

The DSM-IV-TR (2000) provides similar classifications, though with less of an emphasis on the emotional difficulties that may be encountered in childhood. Both the ICD-10 and DSM-IV-TR have sections relating to “other disorders” in childhood which include Selective Mutism and Reactive Attachment Disorder. Both also classify Tic disorders. However, though these areas of difficulty may overlap with the classifications of internalising and externalising aspects of SEBD as described above, these are not the focus of this thesis. As already introduced, this study focuses specifically on externalising difficulties (EB), thus including hyperkinetic and conduct disorders.

Prevalence rates

Among 5- to 10-year-old boys prevalence of conduct disorder in the UK is estimated at 6.5%, rising to approximately 8.6% of 11 to 15 year olds. Prevalence of hyperkinetic disorders is at approximately 2.6% of boys aged 5 to 10 years, falling to 2.3 % amongst 11 to 15 year olds (National Statistics Online, 1999).

1.4.2 Criticism of nosology for SEBD

1.4.2.1 *Diagnostic categories or psychopathological dimensions?*

The DSM-IV and ICD-10 classification systems have attracted criticism. One major concern is around whether a set of symptoms should be considered a disorder when they are induced by a high risk environment or whether evidence of independent internal mechanisms are necessary for a child to be classified with SEBD (Beauchaine, 2003). Perhaps, as Beauchaine (2003) states, “psychiatric disorders reflect deviations from socially constructed prescriptions for behaviour and there are no objective means for demarcating normality from abnormality” (Beauchaine, 2003, p502). Followers of this argument suggest that most psychiatric disorders are characterised by unclear boundaries and a lack of defining features. They claim that diagnostic cut-offs are arbitrary and are wary of diagnosis. Instead they propose that behaviours should be interpreted as falling along a continuum of social acceptability and prefer to consider psychopathology in terms of dimensions, not categories, e.g. Lilienfeld & Marino, (1999).

Perhaps though, the debate between dimensions and categories for SEBD should not concern whether one method is better than the other, but rather we should recognise that many conditions are both dimensional and categorical in different ways (Pickles & Angold, 2003; Rutter, 2008). Rutter (2008) gives the example of medical conditions such as coronary heart disease, hypertension and asthma. If they are severe in degree then they constitute a clear disease category. But, at an earlier point in the disease progression, it works better to consider the features of the diseases dimensionally, for example when measuring the degree of functioning. Thus, applying this to SEBD, and in particular EB, if enough presenting difficulties come together and are severe enough then the child may be classified with a diagnosis of, for example, ADHD or conduct disorder. This should not undermine the importance of considering the impact of presenting difficulties rather than only focusing on those that have been considered to meet the criteria to receive a diagnosis.

Furthermore, some authors have concerns regarding the way classification systems such as these define the problems as lying within the individual, rather than

recognising that the difficulties the individual is experiencing are at least in part due to social and environmental factors around the child. Looked at in this way, EB can be seen as the total response of a person to a situation he faces. This includes the person's own psychological and physiological elements but importantly also considers factors out with the child and how all these factors cause the individual distress (Gates et al 2000). Therefore rather than focusing on some aspects of an individual's behaviour that is not deemed socially acceptable, consideration is made of how behaviours an individual presents with are socially constructed; in other words are due to the interaction between that individual and the social environment in which he is exposed (Bennett, 2005; Tobbell & Lawthorn, 2005).

1.4.3 Implications for service delivery

Though classifications and diagnoses may be useful for ensuring that the child receives support from the appropriate services there are queries over how useful these labels are for the child at this age and the impact that such a label may have on the child in the longer term. Due to such concerns, some areas in the UK (such as the area in which this study was carried out) do not use the classification of, for example, conduct disorder. Whether or not a child has received a diagnosis is also dependent on which services have been involved. If psychiatric services have had input then the child may have a diagnosis of, for example, conduct disorder or ADHD (Bennett 2005). If on the other hand the child has been supported through the school and educational psychology services then a diagnosis is unlikely to have been provided. Therefore a child may have difficulties of a similar severity and nature as another child but may or may not have a diagnosis.

1.4.4 Method of identifying participants in the current study

In this study importance has therefore been placed on the presenting difficulties rather than which "box" a child fits and hence participants were selected not through their diagnosis but by having similar presenting difficulties according to the assessment used in this study. That is, participants are selected as being at high risk of EB from combined parent and teacher completed questionnaires (see Methodology 5.1.2 and 5.1.5 for the assessment used).

1.5 NOSOLOGY OF COMMUNICATION DIFFICULTIES

One of the first attempts to apply nosology to communication difficulties was by Rapin & Allen (1983). They aimed to combine linguistics and neurology in order to arrive at categories of communication difficulties and identified 7 sub-types of what they termed “developmental language disorders”. These sub-groups included forms of autism, severe difficulties with linguistic input processing and severe limitations in expressive language (including speech production). They also introduced the sub-grouping of semantic pragmatic language disorder to refer to children who had difficulties with social communication but did not meet the criteria for autism.

1.5.1 Developments through the 1990s and 2000s

Since Rapin & Allen (1983) put forward their classification system there have been considerable developments in the way we view, assess and diagnose communication difficulties. There has been recognition that, similar to classifying SEBD, there are issues about where to draw the line between what is normal and what can be considered abnormal or impaired. There has also been increasing recognition that the types of difficulties that children present with are actually not often distinct but overlap and merge into each other (Bishop & Norbury, 2002; Bishop & Snowling, 2004; Catts & Kamhi, 2005; Conti-Ramsden, Simkin & Botting 2006). These are issues that are relevant for how we classify impairments in language and social communication skills (or pragmatics). Developments in these two areas will now be discussed in turn.

1.5.2 Language Difficulties

Over the past couple of decades, the term “developmental language disorder” has come to refer more specifically to difficulties with language; that is, difficulties with understanding and /or using the syntax, grammar and semantics of language, rather than the broad range difficulties with communication as described by Rapin & Allen (1983). There are a number of terms that are used somewhat interchangeably to refer to difficulties in this area. As well as developmental language disorder, the terms specific language impairment, language delay, or language difficulties are also commonly used for broadly the same presenting difficulties. The fact that the field has not settled on an agreed term highlights the lack of clarity regarding diagnosis and the uncertainties as how best to conceptualise children’s problems

(Norbury, 2008). Perhaps the most widely used term is specific language impairment. This will now be discussed.

1.5.3 The development of Specific Language Impairment as a concept

At a similar time to Rapin & Allen (1983), Stark & Tallal (1981) introduced the term “Specific Language Impairment” (SLI) and this term increasingly came into common usage in the USA and the UK. Leonard (1998) defines SLI as: “...children who show a significant limitation in language ability, yet the factors usually accompanying language learning problems – such as hearing impairment, low non-verbal intelligence test scores, and neurological damage – are not evident” (Leonard, 1998, p2). An important part of the definition of SLI as set by Stark & Tallal (1981) relies on making a distinction between children who have language difficulties that are “specific” versus those whose language difficulties are part of a more general cognitive impairment. This method of defining SLI (known as cognitive referencing) requires there to be a discrepancy between verbal and non-verbal IQ scores, for example the ICD-10 describes a method of cognitive referencing for SLI that requires there to be one standard deviation between a standardised language measure and a standardised non-verbal measure (i.e. 15 IQ points). However, there is widespread dissatisfaction with this criterion (e.g. Norbury et al, 2008; Tomblin, 2008; Rutter, 2008).

One criticism is that with any standardised test there are wide confidence intervals. A child’s score on a standardised test may vary from one test presentation to another and thus meet criteria on one occasion but not another (Rutter, 2008). Furthermore, the level of discrepancy will be influenced by which particular language assessment is used. Different tests investigate different skills in different aspects of language. Therefore a child may score within the normal range for one aspect but not another (Tomblin, 2008). Studies, (in light of the above problems) have more recently used a weaker form of cognitive referencing, focusing on “children who have language impairments in the context of broadly normal nonverbal ability, without requiring that there be a discrepancy of a given magnitude between language and nonverbal scores” (Norbury et al, 2008, p xiv). For example, Tomblin (2008) reports that in a recent study his research team used a cut-off criteria that scores should be below the 10th percentile in assessments of two or more aspects of

language and performance (non-verbal) IQ should be above 85, and therefore within the normal range for age.

Another criticism is that there is no evidence that children who present with such a discrepancy between their verbal and non-verbal scores differ in the types of language difficulties they present with or their response to intervention from those that do not (Tomblin, 2008). There is evidence that even with a weaker form of cognitive referencing as described above, children with language impairment and nonverbal IQ above 85 differ from those with language impairment and nonverbal IQ score below 85 only in terms of the overall severity of their impairment, otherwise having the same areas of difficulty (Tomblin & Zhang 1999) and a similar response to intervention (Fey, Long & Cleave, 1994). These findings provide evidence that casts serious doubt over whether we should be making a distinction between children with SLI and those with more general learning difficulties. Results such as these have prompted some authors to now prefer the term "Language Impairment" (LI) rather than SLI (Tomblin 2008), thus placing importance on the fact that the child's language skills are poor, and not placing importance on whether their nonverbal IQ skills are or are not also impaired.

A third criticism comes from research that has allowed us to follow children identified with SLI in early childhood into older childhood and adulthood (Bishop & Edmundson, 1987; Stothard, Snowling, Bishop, Chipchase & Kaplan, 1998; Botting & Conti-Ramsden, 2000; Howlin, Mawhood & Rutter 2000; Snowling, Bishop, Adams & Stothard, 2001; Conti-Ramsden, Botting, Simkin & Knox, 2001; Snowling, Bishop, Conti-Ramsden & Botting, 2004; Stothard, Chipchase & Kaplan 2006; Conti-Ramsden, Simkin & Botting, 2006). These longitudinal studies provide growing evidence of changes in the way that children who were identified with SLI present as they get older and for their difficulties being broader ranging than relating to language specifically. There is some evidence that perhaps their nonverbal abilities decline as these children get older (Botting, 2005; though it is of note that there are methodological issues with this study in the way that nonverbal cognitive abilities were measured as different assessments were used at different time points). For others it seems that their presenting difficulties become increasingly autistic as adults, demonstrating what seem to be broader based social deficits than would be expected from difficulties relating to language alone (Howlin et al 2000). Note that

SLI traditionally was thought not to affect social communication skills, with autism an exclusionary criteria (Bishop, 2003). Howlin et al's (2000) study therefore goes against this definition and other studies have also indicated a higher rate of Autism Spectrum Disorder (ASD) diagnoses amongst children identified with SLI than in the general population (Bishop & Norbury, 2002, Conti-Ramsden et al, 2006). For example Conti-Ramsden et al (2006) found that amongst a group of adolescents who had been identified with SLI in early childhood, diagnosis of ASD was 10 times higher than in the general population.

These issues with the classification of SLI means that children with this diagnosis are in reality a very heterogeneous group. Research over the past couple of decades has been carried out with the assumption that SLI is a distinct diagnostic category. The aforementioned reasons show that this has proved to be somewhat controversial. Some researchers have sought to deal with this issue by selecting very specific sub-groups of children with language difficulties. For example Van der Lely and her team (e.g. Van der Lely, Rosen & McLelland, 1998; Van der Lely & Christian, 2000) identified a sub-group they termed "grammatical SLI" as presenting difficulties were specifically with language grammar). However this leads to the group of children being studied lacking in relevance to clinicians and teachers as they are so rarely encountered.

Perhaps instead, the issues with the diagnosis with SLI give support for avoiding the term SLI as a distinct diagnostic category. As discussed, the evidence shows that, as for SEBD, there is considerable overlap between different types of presenting difficulty. Even within the realm of their structural language skills, there are many facets of language. Difficulties can occur to different extents with the grammar, syntax and / or semantics of their expressive and / or receptive language skills. Alongside this a child may have varying degrees of difficulty with speech discrimination and/ or production and social communication (pragmatic language) skills. The evidence points to considerable variability in other aspects of development.

Though subcategories are desirable both clinically and for research it is perhaps better to view the dimensionality within communication difficulties in "pattern terms" rather than assume sharp categorical distinctions (Rutter, 2008, p208). In the

current study the term language difficulties (LD) will be used to refer to children who have significantly low language abilities for their age but not at the exclusion of difficulties in other areas.

1.5.4 Method of identifying participants in the current study

For the aforementioned reasons, in the current study the inclusion criteria for participants with LD were widely defined. All boys with LD regardless of their nonverbal cognitive abilities were included. Furthermore participants were not selected from specialist provision as is a common method in studies of children identified with “SLI” (e.g. Conti-Ramsden et al 2001; Conti-Ramsden & Botting 2004), but more broadly from mainstream pupils who are receiving additional support at school. Again, as for EB, it was felt that it would be more useful to consider the participants’ presenting difficulties rather than their diagnostic classification or educational placement. This method makes the group relevant for the teachers and clinicians who work with these children in the mainstream setting. With the current educational policy emphasis on inclusive education many children with LD and/ or EB will now be in mainstream classes. Consideration will be made regarding patterns within the profiles of participants rather than treating them as a homogenous group.

1.5.5 Pragmatic language difficulties

The term pragmatics was first used to refer to communication difficulties by Rapin & Allen (1983) when they introduced the term “semantic pragmatic syndrome without autism”. This sub-classification, increasingly referred to as “Semantic-Pragmatic Disorder”, was frequently used through the 1980s and 1990s (Adams & Bishop, 1989; Bishop & Adams, 1989; Shields, 1991; Botting, 1998; Kerbel, 1998). More recently the term Pragmatic Language Impairment (PLI) has become more in vogue, with the argument that semantic difficulties are not necessarily part of the presentation (Conti-Ramsden & Botting 1999, Bishop, 2000). PLI has been defined as a descriptive term that “refers to difficulty with using language to convey and understand intended meanings” (Adams, 2002, p974). PLI is seen in children with autism spectrum disorder (ASD) in combination with differences in other areas of development.

1.5.6 Autism Spectrum Disorder and its relationship with PLI

The developments in our understanding and recognition of PLI owes much to our increased understanding of ASD. As stated above, Rapin & Allen (1983) included autism within their classifications of developmental language disorders whereas today it would not be included under this category but rather, is more often an exclusionary criterion. It is of note that the examples Rapin & Allen (1983) gave were extreme and autism was considered rare at this time.

There have been major developments in our understanding and identification of autism since the 1980s. Through the 1990s and 2000s our understanding of the more subtle aspects of how autistic type difficulties can present has developed considerably (Volkmar, Lord, Bailey, Schultz et al 2004). Notably there has been increasing recognition of the autism spectrum, that is, children who do not meet the full criteria for a diagnosis of autism but present with many of the difficulties required for this diagnosis. With this increased understanding, there have been growing rates in the diagnosis of ASD over the past couple of decades with ASD now acknowledged as one of the most common serious developmental disabilities (Rutter, 2005). Developments in this field have given us better diagnostic tools and knowledge in this area and it is through and alongside this that recognition and diagnosis of PLI has evolved.

1.5.7 Issues with PLI as a diagnosis and terminology for this thesis

One major issue with the diagnosis of PLI is that it is not clear where exclusionary and inclusionary criteria are set, to a large part due to a lack of diagnostic assessment tools. In fact some authors query whether it is really a separate diagnosis, or a mild form of ASD (Botting & Conti-Ramsden, 1999; Bishop & Norbury, 2002). The Children's Communication Checklist (CCC and CCC-2, Bishop 1998, 2003) is the only widely used instrument available for identifying pragmatic language difficulties (Ketelaars, Cuperus, van Daal, Jansonius et al 2009), however it is designed as a screening checklist and not a diagnostic tool and to a large extent diagnosis is dependent on clinical opinion. Again as for EB and LD, the emphasis in the current study is on the presenting difficulties and dimensions of ability rather than their diagnostic category. Therefore, particularly as there is controversy around this diagnosis, participants will be identified as presenting with pragmatic language

difficulties (PLD) as identified in the CCC-2 (see methodology (5.1.2) for further details) rather than a diagnosis of PLI.

Although they commonly co-occur, PLD seems to be dissociable from LD and therefore a child can present with one without the other in some cases (Bishop, 2000; Bishop & Norbury, 2002). This stance is supported by other subsequent research (Adams & Lloyd, 2005; Spanoudis, Natsopoulos & Panayiotou, 2007; Ketelaars et al, 2009). However, there is recognition that children with LD more often present with PLD than was previously acknowledged and Bishop (2003) proposes that this is because the impression of PLD may be influenced by the child's structural language skills. If structural language skills are poor then PLD may be overlooked or discounted. However, if structural language skills are rather better then the presence of PLD becomes much more noticeable.

1.6 SOCIAL COGNITION VERSUS PRAGMATIC LANGUAGE

Pragmatic language reflects the developmental connections between communication and social cognition (Carpendale & Lewis, 2004). Thus pragmatic language skills are what we see but these are thought to be dependent on a child's underlying social cognition.

1.6.1 Social cognition

The terms social cognition and Theory of Mind are used somewhat interchangeably. The term "Theory of Mind" (ToM) was coined by Premack & Woodruff (1978) in their work with primates. They used it in a broad sense to describe the ability to attribute mental states in the self and others. This term has since been taken up and used in research with children; however there is a lack of agreement and some ambiguity over what it actually refers to.

Initially the term became synonymous with success of a set of tasks designed to test children's understanding of (mistaken) false beliefs in others (Baron-Cohen, Leslie & Frith, 1985). A classic example of a false belief task would be to present a container with predictable contents, such as a smarties tube and to ask the child to tell what he or she would expect to be in the container. Naturally, the child would state that

the tube contained smarties. Then unexpected contents, such as pencils, would be revealed as the actual contents. The child would then be asked to guess what a new observer, who did not see inside the tube, would think was inside it. To pass this task, the child would need to state that a new observer would think that the box contained smarties, even though the child knows that there are actually pencils in the box. The child therefore needs to understand that another observer would not have access to the same information as he or she did (i.e. the true contents of the tube) and thus would not have the same knowledge that he/ she had. This task therefore requires an individual to take account of the perspective of another and to realise that another person might have a mistaken belief about reality and thus make predictions about how that person might do, say or think. Most studies of false belief have used this format with variations in the content, container and characters involved.

Through the 1980s and 1990s there was a major research interest in children's abilities with such tasks (e.g. Chandler, Fritz & Hala 1989; Astinton & Gopnik 1991; Perner 1992) and, since it is around the age of 3 or 4 that most children succeed on standard false belief tasks there was a research focus on children of this age (Banerjee, 2004). Research was also restricted in investigating belief and knowledge states rather than other aspects of social understanding such as intentions, emotions, perceptions and desires.

However there have been problems with such a narrow definition of ToM. There has more recently been increasing interest in development past the age of 4 years (see Banerjee, 2004). Even with younger children, though many 3 year olds failed the false belief ToM tasks there was increasing evidence that they were successful in negotiating everyday social interactions that required similar abilities (Hughes, 2005). Thus there was growing interest in how children performed in such real life settings in the context of social relationships (e.g. Dunn & Cutting 1999). As a result, a definition of ToM that restricts itself to passing or failing false belief tasks was increasingly recognised to have limited significance for children's actual real life social understanding and competence. Thus many researchers started to subscribe to a much broader definition of ToM, such as Astington & Baird (2005) who defines ToM as "understanding of people as mental beings who have beliefs, desires,

emotions and intentions and whose actions and interactions can be explained by taking account of these mental states”, p3.

Since then the use of the term by some authors has broadened even further. For example de Rosnay & Hughes (2006) state that “whereas once the term (ToM) referred to a narrow range of skills – primarily false belief understanding – it now encompasses numerous distinct domains, including visual perception, attention, desires, emotions, beliefs and related mental representations, knowledge, pretence and thinking” (de Rosnay & Hughes 2006, p7). Some writers prefer to use a different term to ToM to refer to this broader definition, for example “social understanding” (Carpendale & Lewis; 2004) or “socio-cognitive understanding” (de Rosnay & Hughes, 2006). Different abilities such as emotion understanding or false belief understanding are thus aspects within such an umbrella term. Throughout this thesis the term social cognition will be used to refer to this broader definition. The term ToM will be used to refer to the specific assessment tasks when they have been named as such by their developers.

1.7 OTHER TERMINOLOGY USED IN THIS THESIS

1.7.1 Reading Difficulties

Reading is an activity that involves a range of complex thought processes. On the one hand there is reading comprehension, a complex activity that includes reasoning, synthesising, problem solving and interpretation (Catts, 2009). This process involves the ability to take background knowledge and use this when interpreting what we read and furthermore modify this knowledge through the process of reading (Catts, 2009). On the other there is word decoding. This is the ability to read single words, not necessarily with comprehension of the word meaning. This involves learning that letters map to speech sounds in a systematic way (Nation, 2006) and requires the skill to recognise and blend the appropriate sounds through their orthographic symbols. Generally, there is a strong association between decoding and comprehension and if a child has difficulties in one area, he frequently also has difficulties in the other (Nation, 2006). In this thesis, there is a focus on word decoding skills (i.e. the ability to read single words) and this term will

be used to refer to this specifically. The term reading difficulties will be used to refer to difficulties with reading comprehension as well as word decoding.

1.7.2 Nonverbal Cognitive ability

Nonverbal cognitive ability was raised earlier in this chapter (1.6.3) in the discussion regarding the diagnostic criteria for SLI. In tests of cognition it is common for abilities to be separated into those that relate to verbal skills (such as vocabulary knowledge, verbal reasoning) and nonverbal skills (Fawcus, 1997). Nonverbal cognition includes abilities in understanding the meaning of visual information, through for example recognising relationships between visual concepts, and recognising and remembering visual sequences. Many mathematical concepts, physics problems, computer science tasks, and science problems require strong nonverbal cognitive skills.

1.8 CHAPTER SUMMARY

In this chapter classification systems for both SEBD and communication difficulties have been discussed, including the criticisms and limitations of these and the reasons for the participant selection criteria in the current study. The terminology that will be used has also been introduced with reasons given for these choices.

CHAPTER 2: THE ASSOCIATION BETWEEN EB AND LD

The focus of this chapter is on the link between EB and LD, though as part of this there will also be a wider discussion on the links between SEBD and LD. The chapter starts with a review of research into how these types of difficulties may occur and develop individually, followed by a discussion of the mechanisms that have been put forward to explain why they so often co-exist. Following this there will be a focus on factors that are commonly associated with EB and also LD and how these may also contribute to the development of EB. The chapter will finish by reviewing recent research that has identified a high level of pragmatic language difficulties amongst boys with EB, including consideration of the possible reasons for this, with some areas for further research.

2.1 A BIOPSYCHOSOCIAL MODEL OF SEBD

For many decades there has been considerable debate over the role of environmental factors (nurture) and the child's genetic makeup (nature) on child development. This has included consideration of the reasons for the development of SEBD generally, and to some extent the development of EB specifically. In more recent years there is growing recognition that rather than being one or the other, many different aspects of both environment and genetics in combination play an important role. Drawing on research findings from an array of studies investigating a wide range of environmental, biological and psychological causes, biopsychosocial models have been put forward for the development of conduct disorder (Dodge & Pettit, 2003; Hill, 2002) and ADHD (Cooper, 1997, 2006). These models and other literature on the topic will now be discussed regarding the development of EB (and to some extent, where appropriate SEBD).

The biopsychosocial model was first put forward as a medical model by Engle (1977) and since then it has been increasingly taken on board across medicine, notably within the field of psychiatry. The model proposes that biological (genetic makeup), psychological (which includes emotions and thoughts) and social

(environmental) factors all play an important role in the development of disease, illness or disorder.

Though perhaps not always given the title of biopsychosocial model, the importance of the interplay between biological makeup and environment regarding child development has been put forward by other authors. Bronfenbrenner (1977) argued from an ecological and systems perspective that the development of the individual should be understood as the product of the interplay between biological and social processes. He argues that the infant is not a passive recipient but instead actively engages with his or her environment. Therefore, a child will influence the behaviours of others and the likelihood that certain behaviours will be directed at them, for example a child who is temperamentally fussy may lead his parent to burn a short fuse and respond with harsh discipline, or at an older age the child may bring about his own rejection by peers by behaving in ways that peers find unacceptable.

2.1.1 A biological basis

A biopsychosocial model of SEBD proposes that some people are biologically predisposed to follow a trajectory towards developing these difficulties, but this predisposition could still lead to many outcomes. So in the case of EB it is accepted for example, that males of every species are more aggressive (see Dodge & Pettit, 2003) and therefore it should not be surprising that there is a higher incidence of these types of difficulties seen in boys than girls. Linking in with this, genetic research involving twins has revealed a moderate degree of heritability for aggression, delinquency and antisocial behaviour, (e.g. Taylor, Iacono & McGue, 2000; Dodge & Pettit, 2003), for ADHD (Cooper, 1999, 2006) and for the heritability of mental health issues such as depression (Rice, Harald & Thapar, 2002). Furthermore, research has shown that foetuses exposed to opiates or methadone, alcohol, marijuana and cigarette by-products are at increased risk for conduct problems 10 to 13 years later (see Dodge and Pettit, 2003). Thus either due to genetics or neonatal exposure some children are born with a biological predisposition for the development of EB.

2.1.2 Psychological and social factors

Following this model, a child's biological predisposition is always mediated by his environment; that is the cultural, social and political circumstances that the child

encounters at home, in school and the wider community. Such factors interact with each other and with the child's predisposition and thus the child's predisposition towards EB can be amplified and consolidated or reduced, (Hill, 2002). Some important factors in this process will now be discussed.

2.1.2.1 Social disadvantage and social capital

There is evidence that poor mental health in general is linked to social disadvantage (Meltzer, Fryer and Jenkins, 2004; Elliot & Masters, 2009). Social capital concerns the cohesiveness of groups in society, such as family, friends, social networks, work colleagues, or other social institutions (Elliot & Masters, 2009). It is recognised that social capital can affect health, including mental health (Caperchione, Lauder, Gregory, Duncan et al, 2008) as a person's health may be shaped by their socio-economic group or their social status defined for example by the cultural values that they hold. In general greater disparities in health, including mental health, are found in societies where there are greater disparities in wealth, (Elliot & Masters, 2009) and thus in areas of low socio-economic status (SES) there are higher rates of health and mental health problems.

It is likely that the relationship between social disadvantage and poor mental health works both ways. Living in a poorer area is likely to have an impact on mental health; there is evidence that it is more stressful, in part due to poorer community relations (Wilkinson & Pickett, 2009). Conversely a person with poor mental health is less likely to participate fully in their community or economically as an employee. This in turn results in or further intensifies poverty. So together both reasons explain why a person with mental health problems may find it very difficult to move out of poverty and why poverty in turn has an impact on mental health (Elliot & Masters, 2009).

Though most literature on social capital relates to adult mental health, it follows that a child in a family with low social capital is also at greater risk of developing mental health and behavioural issues and this is supported by evidence that early contexts of social disadvantage place a child at greater risk for EB (see Dodge & Pettit, 2003). Beyers, Bates, Pettit & Dodge (2003) identified from census information that socially deprived neighbourhoods (where there are high proportions of families characterised by poverty, unemployment, marital divorce, low education, single

parent households, high residential mobility and low income) represent significant risk factors for conduct problems.

In summary, there is strong evidence that mental health and externalising behaviour problems are more prevalent in areas of social disadvantage. The discussion will now turn to reasons for this.

2.1.3 Reasons for higher rates of EB in areas of social disadvantage

2.1.3.1 Parental mental health

There is evidence that parental mental health, as well as having a biological influence on the child's mental health and behaviour affects the child-parent interaction. Maternal depression is linked with child conduct disorder (Kim-Cohen, Moffitt, Taylor, Pawlby et al, 2005), ADHD (Fergusson & Lynskey, 1993) and depression (Burke, 2003). Depressed mothers have been demonstrated to be less attentive, less likely to engage in interactions with their child, or respond to child's initiations. This has implications for the security of the mother-child attachment (Cicchetti, Rogosch & Toth, 1998; Teti, Gelfand, Messinger & Isabella, 1995) into the preschool years (Campbell, Brownell & Hungerford, 2004) which has been shown to be linked with EB as the child gets older (Kim-Cohen et al, 2005).

There is also evidence that mothers with depression are more likely to have a partner who also has mental health issues, particularly antisocial personalities (Marmostein, Malone & Iacono, 2004) and the mother herself is at a higher risk of having a co-morbid anti-social personality disorder (Kim-Cohen et al, 2003). Again anti-social personality disorder has implications for parental interaction style (as well as for the biological predisposition of the child) and has been shown to be linked with the development of EB (Frick, Lahey, Loeber, Stouthamer-Loeber et al, 1992; Lahey, Loeber, Frick, Applegate et al, 1995; Ehrensaft, Wasserman, Verdelli, Greenwald et al, 2003).

2.1.3.2 Parental Interaction style

Further evidence points to an association between harsh, restrictive and authoritarian parenting and conduct disorder (see Hill, 2002). This form of parenting

is more common amongst mothers in areas of social disadvantage (Hashima & Amato, 1994). It should be noted that physical punishment may be used by parents of children with EB out of desperation (Hill, 2002), again highlighting the issues identifying causes for difficulties rather than associations. A child's difficult behaviour due to the child's temperament can evoke negative parenting and this can cause the parent- child relationship to be locked in a negative pattern (Hill 2002).

2.1.3.3 Family factors

Beyond the child-parent interaction there is evidence for factors in the wider family having an impact on the development of EB. Marital conflict has been shown to have an impact on children's behaviours (Davis & Cummings, 1994; Cummings & Davies, 2002). There is some evidence that repeated exposure to family stress such as parental conflict lowers a child's threshold for psychological dysregulation, resulting in greater emotional and behavioural reactivity (Hill, 2002). There is also some evidence that through parental aggression the child learns that this is a normal and effective way of controlling others (Osofsky, 1995). High levels of parenting stress have also been found to be associated with EB (Baker, Heller & Henker 2003; Bayer, Hiscock, Ukoumunne, Price et al, 2008). Again it is difficult to tease out the causal pathways here but the above findings support the proposal that potentially family issues and interaction styles, more generally than the child-parent interaction could play a role in the development of EB.

Marital status has also been shown to be linked with EB, with a link demonstrated between separated parents and higher rates of EB amongst children (Hilton & DeRochers, 2002). However there is also evidence that there are higher rates of single parents in areas of low SES (Clarke-Stewart, Vandell, McCartney, Owen et al, 2000). Evidence indicates that it is factors linked with social deprivation such as mothers' income, education, childrearing beliefs, depressive symptoms, and behavior that are more closely related with EB than marital status per se (Clarke-Stewart et al, 2000).

2.1.3.4 EB in the school setting

A social constructivist view of development proposes that our understanding of the world occurs as a result of social processes and interactions in which people are constantly engaged with each other (Pomerantz, 2005). Therefore following this

model, EB (and SEBD) develops through a child's interactions and discourses with other people. A child whose interactions and discourses with his parents and wider family have been negative, as described above, will come to school at a disadvantage. As discussed his interaction style may be more aggressive and reactive (Hill, 2002) as he has learned that this is normal and effective. It may also be that he is more used to negative feedback and an authoritarian manner being the norm. This interaction style may therefore be seen as normal in the home setting but may cause problems in school. Furthermore, behaviour that is seen as challenging may to some extent reflect the culture of a particular school and their way of supporting and interacting with pupils, rather than being with the child per se. A child may be labeled as problematic in one setting but not another (Tobbell & Lawthorn, 2005).

Beyond the home environment it is also recognised that peer relationships will be affected by and affect EB. Children who have EB are recognised to be at greater risk of peer rejection (Dodge & Pettit, 2003) and of being socially isolated (Ladd, 2006; Schwartz, Fadyen-Ketchum, Dodge, Pettit et al, 1999) than their typically developing peers. It seems that difficulties with peers can be an active two way interaction and peer rejection can exacerbate both internalising and externalising difficulties (Deater-Deckard 2001) as well as these types of difficulties making peers wary of forming friendships with these children (Hay 2004). This can result in a lack of opportunity to practice their social interaction skills with other children which has been demonstrated to have a detrimental effect on a child's ability to develop social interaction skills at the same rate as their peers. As a result there becomes an ever widening gap between their own and their peer's social abilities (Dodge, Lansford, Burks, Bates et al, 2003). Again this makes it difficult to determine causal pathways, rather than associations.

In the current study information is gathered from both parents and teachers regarding the child's emotional wellbeing and behaviour. In order for a child to be identified as "high risk" of EB both parent and teacher ratings need to indicate concerns. Therefore participants in this group will have difficulties that are problematic at home as well as at school, rather than in one setting only. However it is certainly not argued that the difficulties that the child presents with lie solely within the child. Rather it is proposed that following biopsychosocial and social constructivist models of development, the presenting difficulties are the result of a

combination of the child's biological predisposition (which to some extent is genetic) and their interactions with others throughout their development.

2.2 A BIOPSYCHOSOCIAL MODEL FOR DEVELOPMENTAL DISORDERS

Frith (1992) outlined a model for developmental disorders which, though not named as such, is very similar to the biopsychosocial model described above. In brief, she proposes that cognitive deficits which are caused by biological deficits in brain functioning both affect and are affected by psychological factors such as motivation, maturation and temperament and social factors such as life experiences. All factors influence each other and the child's outcome in terms of how their developmental disability presents. Frith (1992) chooses autism and dyslexia to illustrate her model as both are biologically determined disorders arising from some subtle brain abnormality, occurring probably well before birth.

2.3 A BIOPSYCHOSOCIAL MODEL FOR LD

Though "biopsychosocial model" is also not commonly used as a term with regard to LD, the model described by Frith above can also be applied to difficulties in this area. The current view of LD is that they are the product of a combination of a biological predisposition, interacting with social and cultural expectations of the familial and educational systems as well as psychological factors such as the motivation and personality of the child (Bishop, 2008). The evidence for this will now be discussed.

2.3.1 A biological basis

There is now considerable evidence that LD are heritable and that genes play an important part in causing LD (Bishop, North & Donlan, 1995; Bishop 1997; Bishop & Leonard, 2000; Choudhury & Benasich, 2003). The incidence in families where there is a history of LD is estimated to be between 20 to 40% (Lahey & Edward, 1995). Nevertheless the growing consensus is that for most cases of LD we will not be able to identify a single causal factor: rather, LD should be seen as "a complex multifactorial disorder, in which a collection of risk factors conspires to disrupt language development" (Bishop, 2008, p41). There is considerable evidence that

children can develop good language skills with less than optimal parenting for whatever reason. Conversely there are many parents of children with LD who communicate effectively and plentifully with their child (Bishop, 2008). Thus this adds to the argument that those who have significant difficulty must have some genetic predisposition towards this.

2.3.2 Psychological and social factors

Social disadvantage and LD

There has long been concern that children from low SES backgrounds underachieve academically in general compared to more privileged children and this academic underachievement has been linked with language skills that are inadequate for accessing the curriculum (Ginsborg, 2006). Bernstein (e.g. 1958, 1962) carried out research in the UK in the 1950s through to the 1970s which demonstrated a difference in language competence between children from high and low SES backgrounds. He proposed that children from middle class homes were likely to be socialised, talked to and controlled in different ways from working class children. This difference has since also been demonstrated by, amongst others, Tizard & Hughes (1984), Locke, Ginsborg & Peers (2002) in the UK and by Labov (e.g. 1972) and Hart & Risley (1995) in the USA.

Locke et al (2002) assessed the non-verbal and verbal skills of 240 preschool children in a socially deprived area of England. They found that more than half of these children could be diagnosed as having a moderate (28.3%, defined as 1 to 1.5 SD below the mean), moderate–severe (22.4%, defined as 1.5 to 2 SD below the mean) or severe language delay (9.4% less than 2 SD below the mean). This is considerably higher than the average prevalence rates of approximately 7% (Tomblin, Records, Buckwalter, Zhang et al 1997). However the group's non-verbal cognitive abilities were comparable to the general population. There is evidence that these difficulties with spoken language persist at least into late childhood with reading comprehension skills also affected (Myers & Botting, 2008).

2.3.3 Reasons for language limitations in areas of social disadvantage

Many of the factors related to low SES that have been shown to be linked with EB (discussed in 2.2 to 2.3) have also been found to be linked with language development. This relationship will now be discussed.

2.3.3.1 Parental mental health

Similarly to EB, there is evidence that parental mental health is related to language development. In particular, many of the same aspects of early interaction in a mother who is depressed that have been shown to be linked with EB have also been shown to be related to language development (Cohen & Lipsett, 1991; La Paro, Justice, Skibbe, & Pianta, 2004; Tamis La-Monda, Bornstein & Baumwell, 2001). La Paro et al (2004) investigated factors that predict whether a preschool child with LD will have persistent difficulties into the school years. The variables investigated were maternal depression, maternal sensitivity, child behaviour, child health, income to needs ratio (indicating SES) and home environment. They found that maternal depression and maternal sensitivity were the two most predictive variables of a child's language difficulties persisting into school age. As discussed (in 2.1.2.1) there are higher levels of mental health issues in disadvantaged communities.

2.3.3.2 Parental interaction style

The mother's (or main carer's) interactional style has been identified as a predictor of children's cognitive development including language development (see Ginsborg 2006). In a seminal study in the USA, Hart & Risley (1992,1995) demonstrated the marked differences between both the language input and the child's language output across three different social groups: what they termed welfare families (receiving benefits, perhaps some casual work), working class families (non-professional but steady work) and professional families. Each family was visited every month from the child being 8 months to 3 years. Everything that was said to the child and by the child was documented. At the end of the study the child's vocabulary growth rate and IQ were measured. Considerable differences were found in the language input of parents. For the welfare parents this was found to be on average 600 words per hour, for working class parents it was 1200 words per hour and for the professionals it was 2100 words per hour. Furthermore, the children's vocabulary growth and use closely paralleled the amount of language they experienced. There was still a strong and significant correlation in their vocabulary in their follow-up study when the children were aged 9-10 years (Hart & Risley, 1999).

Furthermore, Hart & Risley (1999) found that not only were there differences in the amount of language addressed to the children, but they also found differences in the amount of time parents spent interacting with their children. Professional parents

spent twice as long as parents in their welfare group. They also found differences in the type of interactions. Professional parents were much more likely to give their child affirmative feedback (15 times per hour) whereas the children in the welfare families received affirmative feedback much less (6 times per hour) and were as likely to hear prohibitive feedback.

These results tie in with other studies in this area. Many of the same aspects of parent interaction style that have been shown to be linked with child EB have also been shown to be linked with language development. That is, mothers of low SES (often measured by low education levels as a proxy), have been shown to more commonly use a harsh authoritarian and restrictive style, and have a tendency to talk less with their children and use a directive rather than facilitative manner. Such factors have been shown to be linked with limitations in language development (Hoff, 2003). Parents with mental health issues (which are more prevalent in areas of social disadvantage) are also more likely to have these types of interaction styles. In particular maternal depression is linked with a less sensitive style, and less interaction and talk with their child (Murray, Fiori-Cowley, Hooper & Cooper, 1996; Murray, Sinclair, Cooper, Ducournau et al, 1999).

2.4 BIOPSYCHOSOCIAL MODELS OF LD AND EB: A SUMMARY

Evidence has been presented for a range of aspects of the child's environment interacting with each other and the child's biological predisposition for the development of both LD and EB. Following a social constructivist account of development, a child develops his way of interacting with the world through his own experience of interactions with others. Therefore EB cannot be seen as a problem lying within the child. The factors discussed are not an exhaustive list; there are other important factors to consider outwith the parent-child and immediate family relationships. This is particularly the case as the child enters the school years, where peers and others become more influential.

2.5 WHAT WE KNOW ABOUT THE LINKS BETWEEN LD AND SEBD

As introduced in Chapter 1 (1.1.1), it is recognised that there is a very high level of co-existence between LD and EB (with estimates of 40 to 90% in a review by Benner et al, 2002). The discussion will now turn to the literature that considers this association. Again the discussion will consider the link between LD and SEBD generally, with a focus on EB where appropriate.

This high rate of co-existing LD and SEBD means that at a minimum approximately half of children with LD have significant SEBD, which puts the rate at over four times that found in the general population (with national estimates of SEBD at approximately 5 to 10% of 5 to 10 year old boys, Green et al, 2005). It is of note that the range of estimated co-existence rate is broad and the reason for this is likely to be due to the different assessments of both language and SEBD that have been used and thus different aspects of ability or functioning that have been assessed, as well as the different cut-offs that are considered “impaired”. There are also considerations to be made regarding the evolving nature of our classification of language and communication difficulties over the past few decades as discussed throughout Chapter 1. However despite these caveats, given the volume of studies over the last three decades or so that all find a high, though varying, co-existence rate there is very strong support for a close relationship between LD and SEBD. Though this relationship is established, we still have little idea *why* this might be the case. As a first step, due to the heterogeneity within diagnoses of both SEBD and communication difficulties, various studies have sought to determine the types of difficulties that most commonly co-occur.

2.5.1 Types of difficulties seen together

Looking at communication skills more broadly than specifically LD, some studies have considered which aspects of communication skills are more often linked with SEBD. These have provided some consensus that certain profiles of communication ability are linked with certain types of SEBD. This evidence comes from two strands of research: (1) studies looking at the behaviour and emotional wellbeing of children primarily identified with communication difficulties (excluding ASD) and (2) studies investigating the communication skills of children primarily identified with SEBD.

2.5.1.1 Types of communication difficulties

Reviews of research into the link between SEBD and communication difficulties indicate that there is a greater association between SEBD and communication difficulties in the domain of language (i.e. LD) rather than speech (Beitchman et al, 1996; Benner et al 2002, Toppelberg & Shapiro, 2000). Though there are some studies that indicate expressive difficulties more often co-occur, particularly amongst older children (Nelson et al, 2005; Ripley & Yuill, 2005), most studies find receptive language difficulties (which most often present alongside expressive difficulties) are the higher risk indicator (Toppelberg & Shapiro, (2000) for a review; Lindsay and Dockrell, 2000; Snowling et al, 2006). More recently there has been recognition of high levels of pragmatic language difficulties in children with SEBD, particularly externalising behaviour (Gilmour, Place & Skuse, 2004; Ketelaars et al, 2009; Mackie & Law, 2010).

2.5.1.2 Types of SEBD

There is strong evidence for a close link between ADHD and LD (Cohen et al, 1993; Beitchman et al 1996; Tannock & Schachar, 1996; Cohen et al, 1998, Cohen, Vallance & Barwick 2000). There is also evidence for a strong link between LD and other forms of EB (Beitchman et al 1996, 2001; Cohen, 2001). Some authors have reported higher levels of EB in early childhood and internalising difficulties in middle childhood (Botting & Conti-Ramsden, 2000; Conti-Ramsden & Botting 2004; Redmond & Rice 1998). However there is also evidence for EB being more prevalent in middle childhood (Beitchman et al, 1996). As discussed in Chapter 1 (1.1.1) there are gender differences in the tendency to present with either internalising or externalising difficulties. This has not been sufficiently recognised in studies to date. It is important that future studies consider the role of gender in the presentation of difficulties, hence the decision to focus on boys only in the current study.

2.5.2 Long term view

2.5.2.1 Children primarily identified with LD

Unfortunately, the long term outcome for children with LD and co-occurring SEBD in childhood is not positive. Beitchman and colleagues followed a group of children originally identified with LD at age 5 years, assessing them for the presence of

possible psychiatric difficulties at age approximately 12 years and 19 years. EB was over-represented compared to typically developing children of the same age at age 5 to 12 years (Beitchman et al, 1996), and at age 19 years there were significantly higher rates of anxiety disorder, social phobia and trends towards higher rates of anti-social personality disorder (Beitchman et al, 2001). They also found significantly higher rates of aggressive behaviour and arrests and convictions than controls at this age (Brownlie et al, 2004). This was found for boys only in their sample and not girls.

Clegg, Hollis, Mawhood & Rutter (2005) followed a cohort of children with severe receptive language impairments from 4 years to middle childhood, early adulthood and through to their mid thirties. They found greater risk of psychiatric impairment (compared to both peers and siblings), particularly concerning depression, social anxiety and schizofrom/ personality disorders. This group also performed poorly on tests of social cognition.

2.5.2.1 Children primarily identified with SEBD

The above studies refer to children who have been primarily identified with LD in childhood. We turn now to children whose language limitations are not recognised as the primary difficulty. Studies that investigate children primarily identified with SEBD show that those with co-occurring language difficulties have the poorest outcomes. From a large scale longitudinal study in New Zealand children with SEBD and LD identified at the age of 5 years were the ones who were most likely to have continuing difficulties with mental health and conduct issues into late teenage years, when compared with boys with SEBD and good verbal abilities (Moffitt & Lynam, 1994). Lahey, Loeber, Hart, Frick et al (1995) found that improvement in conduct disorder symptoms over a four year period was best predicted by verbal IQ (though it is of note that linking in with the discussion in 2.2.1, the presence of a diagnosis of personality disorder in a parent was also highly predictive). A further study by Farrington & Hawkins (1991) provides evidence that verbal IQ at age 8 to 10 years is predictive of persistence in crime at age 21 to 32 years. Linked to this it is of note that there are high rates of communication and literacy difficulties in prison populations that have frequently not previously been identified (Bryan 2004; Snowling, Adams, Bowyer-Crane & Tobin 2000; Snow & Powell 2005).

2.5.3 The issue of unidentified LD

Furthermore, the literature indicates that the language difficulties of children with SEBD are frequently not recognised. Cohen et al (1998a) found that of 380 children aged between 7 and 14 years consecutively referred to psychiatric services, 40% had a language difficulty that had not been previously identified. Similarly in an earlier study of children aged between 4 and 11 years old referred to psychiatric services, 34.4% had unsuspected LD and 27% had previously identified LD (Cohen et al, 1993). Investigations into the differences between these groups (Cohen et al 1998a) indicated that the ones with previously identified LD were more likely to have expressive and social communication difficulties (they devised what they called a “crude index of the social communicative aspects of language” to investigate this), though the two groups were similar in the level of receptive language difficulties. Thus it seems that the children with unsuspected LD had more subtle difficulties that are less easy to identify and more easy to see as non-compliance or inattention. Tying in with this, the group with unsuspected LD were rated as the most “delinquent and depressed” by parents and the most aggressive by teachers. Their group with previously identified LD were rated as more socially withdrawn and anxious than those with unidentified LD.

It is quite likely that these children's performance in social and school situations may be misunderstood and viewed as due to behavioural issues such as non-compliance or inattention rather than their underlying language difficulties and this may result in school exclusion. Indeed, high rates of language difficulties have been found amongst children and adolescents who had been excluded or were at risk of exclusion from school, (Ripley & Yuill, 2005; Clegg, Stackhouse, Finch, Murphy et al, 2009). This, and the finding that difficulties are frequently long term into adulthood, highlights the importance of a better understanding of the needs of these pupils in order to develop more effective early intervention.

2.6 MECHANISM UNDERLYING THE HIGH CO-EXISTENCE OF LD AND EB

The question, *why* do EB and LD so often co-occur has long been asked within the research literature and some authors have put forward possible theories (Rutter & Lord, 1987; Stevenson 1996). For example, in a discussion of this topic, Rutter &

Lord (1987) proposed possible causal links between LD and EB. That is, either EB leading to LD or conversely LD leading to EB. They also proposed that there may be no causal link but that they were part of the same condition or shared a common cause. Throughout this chapter more recent research has been discussed regarding developments in our understanding of EB and LD through the application of social constructivist and biopsychosocial models. These models show that the relationship is likely to be far more complex and interactional than Rutter & Lord (1987) proposed with clear causal pathways unlikely. As discussed in this chapter a number of factors which are known to be closely associated with EB have also been shown to be associated with LD. The relative importance of these in the development of EB when compared with LD, have not been considered. Is it perhaps the case that the LD is not such an important factor in the development of EB as is sometimes assumed, and that other associated variables play a more important role? The following section will discuss some aspects of environment are known to be linked with EB, which are measured in the current study. Following this there will be a discussion of factors that are known to be linked with both EB and LD which potentially are more closely associated with EB than LD.

2.6.1 Environmental factors

As discussed this chapter (2.1 and 2.3) a range of aspects of the environment that are linked with social deprivation have been found to be associated with EB, and many of these are also associated with LD. Measures in the following three areas were selected for investigation in the current study due to evidence for strong associations between these and EB.

2.6.1.1 Parental mental wellbeing

The contribution that parent mental health (particularly maternal depression) and consequent parent interaction style make to the development of both EB and LD have been discussed in this chapter (2.1.3 and 2.3.3). It has been argued that both are important environmental factors that may have a role in the development of difficulties in both areas. Bayer et al (2008) found that of a range of environmental issues it was parenting stress (and also harsh discipline) that were most closely associated with EB amongst children followed up to the age of 3 years. It is

therefore possible that this is also closely associated with EB amongst older children, as in the current study and it was therefore included as a variable.

2.6.1.2 Maternal education

Maternal education is sometimes used as a proxy for socio-economic status. It can be a useful indicator of family functioning as it has been shown to be linked with knowledge about parenting, child development and the levels of stimulation in the home (see Ginsborg 2006). It is also more stable than other measures of poverty such as family income (Huston, McLoyd & Garcia Coll, 2004). A low maternal education level has been recognised to be linked with the incidence of EB (Hill, 2002). Some aspects of language development have been shown to be linked with maternal education (see Ginsborg 2006).

2.6.1.3 Home environment

As stated in 2.1.3.3, Hilton & DeRochers (2002) demonstrated a link between marital status and EB, in that there were higher rates of EB in children of separated parents. In the current study it was decided to investigate who lived at home with the child as this may have an impact on the family interaction style and climate which is linked with EB. However it is also important to note the evidence that an increased rate of EB is actually due to higher rates of single parents living in areas of low SES where there are higher rates of mental health issues, low levels of education and linked with this, parent interaction styles as described earlier in this chapter (see section 2.1.3.3).

2.6.2 Aspects of child ability

This section focuses on aspects of the child's abilities that are known to be linked with LD and EB and that will be investigated in the current study. The literature regarding their association with both LD and EB and the omissions of studies to date will be discussed. As for both LD and EB difficulties these areas may be exacerbated or reduced depending on the environment and personality of the child.

2.6.2.1 Reading Skills

Links between LD and reading difficulties

It is well established that there are strong links between verbal language and reading difficulties (e.g. Catts & Kamhi, 2005; Snowling & Hayiou-Thomas, 2006). Indeed there is a view that LD and dyslexia may both be part of the same underlying difficulty differing only in severity or developmental stage (Bishop & Snowling, 2004). As well as reading comprehension difficulties that link in with their verbal language comprehension difficulties, children with LD are at a higher risk of word decoding and spelling deficits due to the phonological impairment that is often part of their presentation (Snowling & Hayiou-Thomas, 2006). They are also more likely to have difficulties with reading due to the semantic and syntactic demands (Bishop & Snowling, 2004).

In what seems to be the only large scale study investigating the association between reading disability, behavioural disorder and LD, Tomblin, Zhang, Buckwalter & Catts (2000) found that 52% of their sample of children with LD had a reading disability, compared with only 9% of typically developing children in their control group. When they investigated the links between LD, behavioural disorder and reading disability, they identified reading disability as a mediating variable for children with LD who were presenting with behaviour disorders rather than the verbal language difficulties per se being linked with the behavioural disorder. In other words, when the reading ability of participants was controlled for, verbal language ability on its own was no longer predictive of behavioural disorder. This study implies that these children with reading disability had behaviour difficulties due to the impact of these difficulties on self-esteem and frustration. However, it is possible too that to some extent the association works in the opposite way. That is, pupils with behavioural difficulties may have difficulties learning to read due to factors such as poor task engagement (Morgan, Farkas, Tufis & Sperling, 2008).

This finding was not supported by Conti-Ramsden & Botting (2004) in their longitudinal study of children with LD. They found aspects of verbal communication skills to be more closely linked to poor social adjustment than reading ability. However as they point out this may well be because their sample was a long term clinical population of children attending specialist language provision and so their reading ability was very depressed in general. Conversely Tomblin et al's (2000) sample was from a large scale population study that used screening measures to identify participants. It is also the case that different measures for emotional

wellbeing/ behaviour were used. Conti-Ramsden & Botting (2004) investigated victimisation and social competence rather than behaviour disorder.

Links between EB and reading difficulties

Reading difficulties will unavoidably have a huge impact on a child's ability to access the academic demands of school. It is not surprising that there is considerable research that has shown reading disability to be linked with EB (McGee, 1986; Hinshaw, 1992; Maughan, 1994; Carroll, Maughan, Goodman & Meltzer, 2005; Morgan et al, 2008). Morgan et al (2008) demonstrated a two way relationship, that is, children in first grade with behavioural difficulties were more likely to have reading difficulties two years later. Conversely children with reading difficulties in first grade were also more likely to have behavioural difficulties two years later (behaviour problems were measured as poor task engagement, poor self control and internalising and externalising behaviour problems). Therefore it may be the case that reading ability, which is closely associated with LD, has a closer relationship with EB than LD has to EB, as found by Tomblin et al (2000).

2.6.2.2 Non-verbal cognitive skills

As discussed in Chapter 1 (1.6.3) it is common for children with LD to have co-occurring difficulties with non-verbal cognition alongside their language limitations. In a discussion of the possible mechanisms underlying the link between LD and SEBD, Stevenson (1996) identified that an issue with many studies in this area is that they have not fully considered the role of non-verbal cognitive skills. He reported a lack of consistency in the use of assessment and definition of language disabilities making it unclear whether there is a link between low intellectual functioning in general, or whether the link is specifically with language ability. Stevenson (1996) therefore called for more research to determine the importance of different types of learning difficulties in the link with EB. Fifteen years since Stevenson's writing, it continues to be the case that in studies investigating the link between LD and SEBD, non-verbal cognitive abilities are not always fully considered. As discussed in Chapter 1 (1.6), there is a lack of consistency in how LD is defined and the amount of information that is made available regarding nonverbal cognitive skills. There is however some research that has some interesting findings in this area.

Benasich, Curtis & Tallal (1993) followed up a group of children who had originally been identified with LD at age 4 years by Tallal, Dukette & Curtiss (1989). The group had been screened to exclude English as an Additional Language, ASD, Hearing Impairment, low nonverbal cognitive skills, neurological hard signs and speech only disorders. In the original study 6% were identified with SEBD compared with 0 controls. In the follow-up at age 8 years, 32% were identified with SEBD, compared with 9% of controls. They found that an improvement or a decline in language ability did not predict whether they were identified with SEBD but rather it was a decline in nonverbal cognitive skills that was most predictive. Thus they propose that the higher incidence of SEBD reported in the earlier Tallal et al (1989) study may be related more to lower general cognitive ability than to linguistic deficit per se.

Similarly in a more recent study, Snowling et al (2006) followed up a group of children who had been identified with LD at age 4 years by Bishop & Edmundson (1987). At age 15 years Snowling et al (2006) found low nonverbal cognitive ability was more predictive of poor psychosocial outcome (measured as attention and social difficulties), than any aspect of language functioning.

However, there is research with children with SEBD that contradicts this. Ripley & Yuill (2005) investigated patterns of language and nonverbal cognitive abilities of children who had been excluded from school. They found no significant difference between this group and a group of typically developing peers in their non-verbal cognitive skills, though they scored significantly lower in their verbal language skills. Similarly Mackie & Law (2010) found that in a group of children primarily identified with SEBD there was no significant difference in non-verbal cognitive ability from a typically developing control group. The group with SEBD did have significantly poorer verbal language skills however. In the current study assessment of nonverbal cognitive skills will be included to consider whether the association with EB is specifically with language skill or cognitive functioning more generally.

2.6.2.3 Pragmatic Language skills

It is well recognised that children with behavioural disorders often have problems with their social communication skills. Indeed Maag & Katsiyannis (1999) go as far as to state that “a lack of social competence is probably the one area of dysfunction that most uniformly describes students with EBD” (1999, p36). However until

recently, despite this assumption little progress had been made in quantifying these for lack of an adequate assessment. As mentioned in Chapter 1 (1.6.5) the Children's Communication Checklist (CCC and CCC-2, Bishop 1998, 2003) was developed to provide a standardised means of identifying children with pragmatic language difficulties.

Gilmour et al (2004) used the CCC to investigate the pragmatic language skills of children aged 5 to 10 years old diagnosed with conduct disorder and compared their scores with children of the same age who had received a diagnosis of autism. Importantly they found that two thirds of children identified with conduct disorder actually had pragmatic language difficulties of a quality and degree similar to children on the autism spectrum; thus supporting their proposal that pragmatic language difficulties underlie antisocial behaviour in a proportion of children labelled as having conduct disorder. They suspect a causal relationship between pragmatic language difficulties and school exclusion. However, they do state that it is important to acknowledge the important roles that social, cognitive and psychological factors may play in engendering disruptive behaviour at school. They further state that "these factors almost certainly interact with one another and contribute in a complex manner to that outcome" (Gilmour et al, 2004, p976). This lack of investigation into the role of other such factors is a limitation of their study. They note that there were far more boys than girls amongst their participants in both groups, however a second limitation is that they do not consider the gender differences in the presentation of difficulties. It is also of note that we do not know how qualitatively similar the pragmatic language difficulties in their conduct disorder group are to their group with ASD.

Mackie & Law (2010) (see appendix XI) sought to take Gilmour et al's (2004) study a step further and had two main aims. Firstly, we sought to investigate the level of association between pragmatic language skills and SEBD to see whether the high levels of pragmatic language difficulties found by Gilmour et al (2004) could be replicated. Secondly, we sought to find explanations for any such association by carrying out investigations into social, cognitive and psychological factors, specifically language, literacy (word decoding), non-verbal cognitive ability and socio-demographic factors. The study recruited children (n=17) who were identified as having behaviour that is causing concern at school and thus referred to

Educational Psychology services. Comparisons were made with a SES and age matched typically developing control group. Children in the referred group were significantly more likely to have structural language, word decoding and pragmatic language difficulties and mothers with no further education beyond school. Though there was a link between literacy and behavioural difficulties, the majority of referred children had pragmatic language difficulties. No child had structural language difficulties without either co-occurring reading and/ or pragmatic language difficulties, indicating that perhaps LD is not associated with SEBD as much as pragmatic language (and to a lesser extent reading ability). This study has guided this section of the current study.

A further recent study has investigated the role of pragmatic language in the link between behavioural difficulties and LD in community samples. Ketelaars et al (2009) used a Dutch version of the CCC to investigate pragmatic language skills and found that in a general population sample, behavioural problems were related to pragmatic language difficulties and this association was stronger than between behavioural problems and structural language difficulties. A limitation of this study is that the only assessment of structural language skills was the parent ratings of ability within the CCC, rather than a standardised formal assessment which gives fuller information.

2.7 AREAS FOR FUTURE RESEARCH

The current study was developed from the study by Mackie & Law (2010) that found in a small participant group there were high levels of pragmatic language difficulties. It was intended to try and replicate this study with a larger participant group and with a wider range of associated variables included to consider the relative strengths of association with EB. It was also intended to investigate any impact LD have on the presentation of pragmatic language difficulties, compared with participants without LD, and therefore their presentations of EB. The potentially high level of pragmatic language difficulties amongst these children raises questions regarding the reasons for these and whether this is associated with social cognitive limitations. This is the topic of the next chapter.

As discussed throughout this chapter, there are many factors that are known to be closely associated with EB that have also been shown to be linked with LD. Studies investigating the link between LD and EB have generally focused on the strong association between the two but have not fully considered the strength of association between other aspects of the child's abilities or their environment. In the current study, consideration of some of these factors as introduced (which have been identified due to their recognised association with EB and LD) and the strength of their association with EB will be investigated.

2.8 CHAPTER SUMMARY

In this chapter biopsychosocial models for the development of EB and LD were introduced with consideration too of how EB in particular may be socially constructed. This was followed by a discussion of the literature regarding the links between LD and EB (and SEBD). There have been attempts in the past to consider the mechanism underlying this link between LD and EB. This was discussed with consideration of the potential importance of factors that are known to be linked with both EB and LD which may increase the likelihood of EB. Recent research has investigated the pragmatic language skills of children with EB and this was discussed. Areas for investigation in the current study were outlined. In the next chapter the focus turns to social cognition.

CHAPTER 3: SOCIAL COGNITION, LANGUAGE DIFFICULTIES AND EXTERNALISING BEHAVIOUR

This chapter will focus on social cognition and is composed of three main parts. In the first part a social constructivist account of typical development of social cognition from the early years to middle childhood will be provided. This is followed by a discussion of the issues regarding measuring social cognition, the tests of social cognition that have been developed and reasons for individual variation in ability with these tests. This section ends with a brief discussion of the research into social cognition in children with ASD before focusing on research into abilities of children with LD, including limitations of research that has been carried out to date. Due to the high prevalence of LD amongst boys with EB, this informs our understanding of EB. The second part considers research that has investigated the friendship skills of children with LD and areas for future research. In the third part there is a review of the research into the social cognition of children with EB, again with a discussion of the limitations of research to date and areas for future research.

3.1 TYPICAL DEVELOPMENT OF SOCIAL COGNITION: A SOCIAL CONSTRUCTIVIST ACCOUNT

There has been much debate about how social cognition develops and the possible causal connections between social cognition and language development; these areas have been a major topic of research in developmental psychology in the past three decades (see Astington & Baird, 2005). Evidence is accumulating that the development of social cognition is a gradual process that is closely intertwined with language development, and thus both social cognition and language affect each other in complex ways.

Following a social constructive theory put forward by Carpendale & Lewis (2004), social cognition develops through triadic interactions; that is interactions that involve the child, another person and the world. Through such triadic interactions the child gradually constructs knowledge about the world as well as knowledge about other people. The extent and nature of these interactions will influence the development of social understanding. Importantly, their theory highlights that the child is taking an

active role, rather than being a passive recipient in these interactions. Furthermore, it is through these same interactions that the child develops language; hence social cognition and language development are tightly interwoven. This gradual process is illustrated in how a child starts to use words with incomplete understanding, for example using “ball” to refer to all round objects and this gradually becomes more specific to the target. Likewise the child’s initial fragile social understanding is incomplete and is supported and develops through social interaction (Carpendale & Lewis, 2004).

3.1.1 Typical early development of social cognition

This process of learning through triadic interactions is illustrated by research into joint attention, a skill that usually develops in infants and is now seen as an early component of social cognitive development (Baron-Cohen, 1995). Beginning at around 6 months, infants come to understand that others intend for him or her to pay attention to a specific aspect of an object or event (Tomasello, 1995). This links in with language development, as the ability to respond to adult bids for joint attention has been found to be associated with vocabulary development in typically developing children (e.g. Carpenter, Nagale & Tomasello, 1998). Joint attention has also been demonstrated to positively correlate with later performance in ToM tasks (Charman, Baron-Cohen, Swettenham, Baird et al 2000). Children with ASD exhibit early deficits in joint attention, and this seems to be a crucial aspect of their communicative deficit (Sigman & Ruskin 1999).

Around their third year children begin to talk about mental states, though initially, as would be expected following a social constructivist model, their understanding of these terms is not comprehensive and develops over time as the words are encountered in more and different settings. Around or just after this time too children typically pass the false belief task (as described in Chapter 1, 1.6.1) (Astington & Baird, 2005). The ability to pass this task indicates that they can theorise about someone else’s mental state explicitly and understand that their representation of a situation may not mirror reality. Though there has been a move away from the intense focus on the false belief task in research it still has value as a “litmus test” of a representational ability that allows subsequent development to grow (De Rosnay & Hughes, 2006). However, it seems that the ability to pass ToM tasks, including the

false belief task is gradual and context dependant. Children do not shift from always failing to consistently passing them in one smooth movement.

3.1.2 Typical development of social cognition in the school years

As a major focus of research into social cognition has been on false belief understanding, relatively less attention has been paid to social cognitive development beyond this age (Banerjee, 2004), though there is increasing awareness that our social cognition continues to develop well into adulthood (Carpendale & Lewis, 2004, Carpendale & Lewis, 2006; Banerjee 2004). As a result our understanding of typical development of many aspects of social cognition in middle childhood is relatively limited. To a large part this lack of understanding is due to the much broader and more complex range of abilities that social cognition encompasses as the child gets older and abilities develop, making it more difficult to assess and measure.

3.1.3 Assessments developed for the school aged child

Nevertheless, some progress in our understanding has been made. There is evidence that understanding of the complexity of emotions develops over middle childhood, for example understanding that emotions are multifaceted and that you can chose how you present your emotions (McDowell, O'Neil & Parks, 2000; Wellman & Lui, 2004) or that you can experience more than one emotion at a time (Harter & Buddin, 1987). As children get older their understanding becomes more sophisticated as they gain insights into their parents, peers and others' psychological states and motivations behind their behaviour. This level of understanding is important in the development of attachment relationships over the middle childhood years and is also important for how friendships develop over this time, a time in which friendship becomes more to do with being psychologically compatible rather than a companion in physical play (Raikes & Thompson, 2005). Wellman and Lui (2004) developed a Scale of ToM which includes an assessment that investigates understanding that a person may chose to hide how he presents his emotions. Comprehension that there is a gap between internal feeling and outer expression can be recognised to be one of the later aspects of the development of emotional understanding. Such ability involves understanding that concealing real feelings can protect a person from getting hurt by others or from hurting other people's feelings (Harris, 1989).

There is also evidence that the ability to use the social context rather than the literal meaning of what someone says develops over this age range (O'Hare, Bremner, Nash, Happé et al 2009). The Happé Strange Stories (Happé, 1994) were developed as an advanced ToM task to investigate ability in this area through a series of naturalistic vignettes about everyday situations where people say things that they do not really mean literally, with a range of different motivations. Thus the aim was to extend the range of tasks involving ToM to a more contextually embedded and realistic form. They were originally developed as an advanced test of ToM for people with autism, though they have been used with other populations.

Understanding what another person thinks a third person thinks or will do (known as second order ToM) has been shown to develop after understanding of false belief (sometimes known as first order ToM), (Perner & Wimmer, 1985). In these tasks the child is required to consider not only a person's perception of a situation (first order reasoning) as in a false belief task but also an individual's concern about a third person's mental state (second order reasoning), in other words to consider "he thinks that she thinks..." (Sullivan, Zaitchik & Tager-Flusberg, 1994). In typical development children are thought to pass these tasks between the ages of approximately 4 years (Sullivan et al, 1994) to 6-7 years (Perner & Wimmer, 1985). This seems to depend to a large extent on the complexity of the language in the assessment task, with a likely issue for younger children being the language complexity and information processing demands of the task (Sullivan et al, 1994).

For all these tasks however it is unclear how much ability relates to functional skills and the extent they pick up on social cognition over and above linguistic and information processing skills. Part of the difficulty measuring social cognition in middle childhood is that cognitive processing generally gets much more complex as a child gets older and social understanding becomes more flexible and more elaborate (Harris, 1989; Nelson 2005). Language plays an important role and as language skills and thought (through language) become more sophisticated it becomes difficult to separate out language and social cognition (Nelson, 2005). As Dunn & Brophy (2005) state, "it is evident that many standard assessments of emotion understanding and theory of mind are language based. In focusing on these associations are we simply picking up on differences in children's language

abilities?” (Dunn & Brophy, 2005, p52). This is an issue for measurement in typically developing children, but becomes even more of an issue for children with LD.

3.2 INDIVIDUAL VARIATION

It is recognised that there is considerable variation in the rate children develop social cognition and thus pass ToM tasks and there has been much research interest in the reasons for this individual difference which will now be discussed.

3.2.1 Social factors

Growing evidence documents associations between social factors and children's social cognitive development. Elizabeth Meins and her colleagues (e.g. Meins & Fernyhough, 1999; Meins, Fernyhough, Wainwright, Clark-Carter et al 2003) have demonstrated that the child's mother plays a particularly important role in the child's development of social cognition. Specifically the mother's tendency to treat her infant as an individual with a mind, (what Meins terms “mind-mindedness”) correlates closely with the age the child later pass ToM tasks and assessments of emotional understanding.

Judy Dunn and her colleagues have highlighted that the social world of children involves more than just their mother. Through a number of studies she has demonstrated that siblings and the wider family play a role and that children raised in families in which there are commonly discussions about other people's emotions, perceptions and expectations pass ToM tasks at a younger age (e.g. Dunn, Brown & Beardsall, 1991; Dunn & Brown, 1994). Indeed there is evidence that the number of siblings a child has alone seems to influence the age he or she passes false belief tests, indicating the importance of child-child interaction (Jenkins & Astington, 1996). There is some evidence too for children from lower SES backgrounds being slower to pass false belief tasks (Holmes, Black & Miller 1996; Cutting & Dunn, 1999).

3.2.2 Linguistic ability

As de Rosnay & Hughes (2006) state “the question of how language relates to ToM is currently a hot topic in developmental psychology” (de Rosnay & Hughes, 2006,

p7). Child language ability has been shown to be robustly associated with ability in ToM tasks across a wide range of tasks and ages (de Rosnay and Hughes, 2006; Nelson, 2005; Dunn & Brophy, 2005). Nelson (2005) goes so far as to say “the only ability that has clearly been shown to be directly linked with ToM is language” (Nelson, 2005, p 26).

However, the term language can refer to a wide range of aspects of communication, and hence there is a wide range of language assessments used (Milligan, Astington & Dack, 2007). Language can be used for social communication, for mental representation and the term can also refer to the structural aspects of language encompassing syntax and grammar (Astington & Baird, 2005). Different theorists argue for different aspects of language being more or less important for the development of social cognition and for the ability to pass ToM tasks and these can be split into two main camps: those highlighting the communicative aspects versus the representational aspects of language (Astington & Baird, 2005).

Some researchers such as Dunn & Brophy (2005), Nelson (2005), Harris (2006) argue for the communicative aspect playing a key role in the development of social understanding. These researchers believe that the child becomes aware of the mental states of others through conversations and stories, gradually realising that they know things that others don't know and conversely others have information that is new to them. In this way language facilitates the development of the ability to simulate another's perspective because conversation involves a constant exchange of differing points of view (Harris, 2006). Well coordinated conversations require ongoing predictions as to what the other person will understand, and repairs and clarifications are called for when these predictions are incorrect.

Other researchers, notably de Villiers & Pyers (2002), emphasise that it is the representational aspects of language that play the key role. Specifically de Villiers & Pyers (2002) argue that the development of complex syntactic structures that are required to attribute different points of view (sentential complements), allow children to think about what is in other people's minds. In their meta-analysis of the role of different aspects of language for social cognition, Milligan et al (2007) included studies that used standardised assessments of aspects of representational language. They found a significant relationship between scores in assessment of

general language, semantics, memory for sentential complements, receptive vocabulary and syntax and ability to pass ToM tasks. This, they state, indicates that all aspects of representational language play a role. They highlight that they do not dismiss the important role the communicative aspects may play, but focused on representational language due to the issues of gathering information about a child's social communication skills in a standardised way.

Though the importance of the communicative aspects may not yet have been demonstrated, these are not necessarily competing theories and both representational and communicative aspects most likely play a role and are dependant on each other (Astington & Baird, 2005). The representational aspects of language provide the tool by which one can follow and process the information in a ToM task and verbalise an appropriate answer. These representational aspects of language allow a person to develop self-talk with which they can reflect on and question their own actions as well as reflect on those of others (Zadeh, Im-Bolter & Cohen, 2007). The communicative aspect relates more to how we use and understand language socially. In order to do this we need to be able to accurately attribute thoughts, feelings and ideas to others and use the information to predict others' behaviour, as well as adjust our own conversational input.

3.3 SOCIAL COGNITION IN CHILDREN WITH AUTISM

There is an extensive literature on the development of social cognition (particularly ability with ToM tasks) in people with autism (e.g. Tager-Flusberg 1992; Frith & Happé, 1994; Tager-Flusberg 1999; Baron-Cohen, Golan, Chakrabarti, Belmonte, 2008). Children with autism are well known to have deficits in their development of social cognition, specifically their ability to see the perspectives of others: "Autism is characterised by significant limitations in the range of functions served by language; limitations that can be directly attributed to impaired understanding of other minds" (Tager-Flusberg, 2000, p125).

Studies have compared autistic children's ability with ToM tasks against various control groups, including typical development, general learning disabilities, Down's Syndrome and LD (Ziatas, Durkin & Pratt 1998, Baron-Cohen, Leslie & Frith, 1985,

Yimiya, Pilowsky, Solomonica-Levi & Shulman, 1999). Across most studies a consistent finding is that children with autism perform significantly worse than children in the control groups, even though in most of the above studies children in the other groups also do not perform as well as their typically developing peers.

There is however some variability in the ability to pass ToM tasks amongst those with autism. It seems that those who can pass have a higher level of language ability than required by typically developing or “intellectually impaired” populations (Happé, 1995). Tager-Flusberg & Joseph (2005) suggest that these individuals are using a different route to passing these tasks, drawing on their language skills to compensate for their difficulties with social cognition. Thus their strength in their language skills help them to “bootstrap” an understanding of false belief and other aspects of social cognition when confronted with these tasks.

Tager-Flusberg & Joseph (2005) proposed a model that considers what they term the social perceptual and social cognitive components of ToM. The social perceptual component involves real time judgements of mental states based on information available in faces, voices or body gestures. The social cognitive component includes a representational understanding of the mind and involves reasoning about the content of mental states by integrating information across perceptual cues and sequences of events over time. It depends on the ability to make inferences and is linked to language development and other cognitive processes more closely than the social perceptual component. They propose that these two aspects can be viewed within a developmental framework; social perception comes first and feeds into the development of social cognitive understanding. In people with autism, they argue, it is the social perceptual component that develops differently from typically developing children and language ability within this population is the most significant diagnostic characteristic for long term cognitive social and adaptive outcomes. They propose that children with autism and near normal language development do not use the social perceptual component i.e. judging others’ mental states from non-verbal social information. Instead they use language to reason logically through false belief tasks, or interpret what others know or believe on the basis of their experience with specific events. That is, they arrive at the appropriate response through a different route to typically developing children who use their experience from situations in which they have used social perceptual skills and apply these to

the more cognitive and representational ToM tasks. It is not known whether children with limited language (such as a child with LD) can do the reverse and use other skills (perhaps good social perceptual skills) to overcome their limited language and also perform well with these tasks.

3.4 SOCIAL COGNITION IN CHILDREN WITH LANGUAGE DIFFICULTIES

There are a number of studies that have sought to investigate social cognitive ability in children with LD, with all studies using the diagnostic term SLI (Leslie & Frith 1988; Shields, Varley, Brocks & Simpson, 1996; Ziatas, Durkin & Pratt, 1998; Farmer, 2000; Miller 2001; Gillott, Furniss & Walters, 2004; Marton, Abramoff & Rosenzweig, 2005; Norbury, 2005; Farrant, Fletcher & Maybury, 2006). Most of these studies have considered ability with false belief and some other ToM tasks. Despite what we know about the inter-relationship between language and social cognitive development, earlier studies such as Leslie & Frith, 1988; Shields et al 1996; Ziatas et al 1998 indicated that children identified with SLI performed as well as typically developing controls in ToM tasks. However, other more recent studies do indicate delay (Farmer 2000; Miller 2001; Gillott et al, 2004; Marton et al, 2005; Farrant et al, 2006).

3.4.1 Assessment of social cognition in children with LD in middle childhood

A limitation of some of the above studies raised by Gillott et al (2004) is that there has been an over-reliance on the false belief task and a failure of many studies to investigate ability with an age appropriate measure. Gillott et al (2004) point out that earlier research (such as Leslie & Frith 1988) used the false belief task and yet involved children with LD who were much older than the age false belief tasks are usually passed. They propose that this is the reason they did not identify these children as having any difficulties. In the current study participants are aged between 8 to 12 years old and therefore the false belief task alone is not an appropriate assessment. Assessments of social cognition that have been developed for this age group have been introduced earlier in this chapter (3.1.3). The relevant literature around these and the limitations of investigations in this area to date will now be discussed.

3.4.1.1 Happé Strange Stories (Happé, 1994)

The Happé Strange Stories are perhaps the most widely used assessment of social cognition in older children and were originally developed to investigate social cognition in people with autism (Happé, 1994). The assessment investigates the ability to correctly attribute mental states to others as opposed to (1) incorrectly attributed mental states or (2) responses that refer to only physical aspects of the situation and do not make any reference to mental states. They are now quite commonly used in clinical settings as an assessment of social cognition, despite a lack of normative information for this assessment. Recently however this has been addressed by O'Hare et al (2009) who gathered data from 140 typically developing children aged between 5 and 12 years. They found that performance did improve with age. Children aged between 5 and 6 years managed to achieve on average one third of the possible total score, though even at age 12 years, the total scores did not reach ceiling. They also identified that the stories investigating understanding of sarcasm and persuasion were particularly difficult for this older age group. The Happé Strange Stories have been used in two studies to investigate social cognition in children with LD of a similar age range to the current study (Farmer 2000, Gillott et al, 2004) which will now be discussed.

Gillott et al (2004) sought to minimise the issue of heterogeneity within their group of children with LD aged between 8 and 12 years (n=15) by selecting children with phonologic-syntactic difficulties only, comparing their ability with age matched typically developing children (n=15) and high functioning autistic children (n=15). They found that the typically developing children gave more correct mental state answers to the Strange Stories questions than either of the other two groups, which performed similarly in the number of correct answers provided. These two groups differed in that the autism group gave more incorrect mental state responses. The children with LD provided what they term "a more heterogeneous pattern of responses" (Gillott et al, 2004, p7).

A major issue with this study is their method for selecting a LD group. Their phonologic-syntactic group is reported to have been identified by a diagnosis from a Speech and Language Therapist. Children who had additional language difficulties (such as semantic or pragmatic difficulties) are reported to have been excluded, but they do not give information about the criteria for these diagnoses. They did not

assess receptive, expressive or pragmatic language skills or non-verbal ability as part of the study, but report that “children in all groups had intellectual and reading abilities within the average range, as assessed by their teacher or therapist”, (Gillott et al, 2004, p4). A global measure of communication ability using the Vineland Adaptive Behaviour Scales – Interview Edition (Sparrow et al, 1984) was carried out. However this is a checklist completed by parents and teachers and thus does not give a formal standardised direct measure of structural language skills, and provided limited information beyond that both the autism group and LD group performed similarly and significantly lower than the typically developing group. This raises questions about the pragmatic language skills of their LD group. Furthermore, they state that the children in their LD group were “not reported to experience comprehension difficulties” (Gillott et al, 2004, p8), however it is unusual for children with language difficulties not to have difficulties affecting both their comprehension and expression (Bishop & Leonard, 2000). More thorough assessment information would have given a better picture of the children that participated.

Gillott et al (2004) themselves concede that heterogeneity in the group of children with LD may have contributed to their doing less well than the typically developing group, despite being selected for phonologic-syntactic difficulties only. As they say “other unreported or newly emerging language problems, such as pragmatic or language comprehension” (Gillott et al, 2004, p 9), in some members of the LD group may have accounted for their results. Thus they call for further research that explores ToM ability in children with different specific language difficulties. They also state that further research should consider the possibility that differences in responses may be attributable to intellectual ability, and therefore should include a measure of nonverbal cognitive skills. It should also be noted that the number of participants in this study is very small.

A second study that investigated social cognition in children with LD (again using the diagnostic term SLI) was carried out by Farmer (2000). She also recognised the problems of regarding children with LD as an undifferentiated group and therefore provided quite detailed information regarding nonverbal cognitive ability and language profiles and sought to exclude children with what she termed Semantic Pragmatic Language Disorder and autism. She compared four groups: 8 boys with LD in mainstream settings, 8 (7 boys and 1 girl) in a special school setting, 8

chronologically matched and 8 language age matched children (both groups with 5 boys and 3 girls). All were aged between 10 and 12 years old. The groups were presented with 6 of the Happé Strange Stories, and a first and a second order ToM task. She found that both groups with LD passed the First Order ToM task and performed more poorly on the Happé Strange Stories than the matched control groups. In the Second Order ToM task the LD group from the special school setting performed significantly poorer than the control groups, but there was not a significant difference for the LD group in a mainstream setting. However there are a couple of limitations. Firstly group size is very small and in addition to reduced statistical power, the recognised heterogeneity within LD limits the extent we can make generalisations from this study. Secondly, in discussing the reason for the LD group's performance she did recognise that some of their participants had some pragmatic difficulties, though did not include a measure of these. This, as she suggested, may be a contributing factor to lower scores in this group. Again this study points to the need for further research that considers the role of different aspects of language and communication skills.

3.4.1.2 Other relevant research using the Happé Strange Stories

In an investigation of social cognition in children with ASD (mean age 12;10 years), children with cognitive delay (mean age 12;3 years) and typically developing children (mean age 4 years) using a false belief task, Happé (1995) found that score on verbal language assessment did correlate with ToM ability. She discusses how an omission in their study design is the lack of information about participants' nonverbal cognitive abilities. As she proposes, perhaps the language assessment score is an indicator of general cognitive abilities rather than language specifically and that the observed close relationship between language ability and ToM ability may be mediated by general cognitive ability rather than language specifically. It is also of note that Happé (1995) only used a receptive vocabulary measure, the British Picture Vocabulary Scales (BPVS, Dunn, Dunn, Whetton & Pintilie, 1982) to give a measure of verbal language ability, rather than a composite measure of language. Gillott et al (2004) also acknowledge that an omission in their study investigating ability with the Happé Strange Stories in boys with LD is that they did not consider the general intellectual ability of the group and that assessment of nonverbal cognitive skills is required, as this could be a reason for limited ability rather than language skills.

A final study of interest here is an investigation of the links between metaphor and ToM understanding by Norbury (2005). She found that children with LD had difficulty with understanding metaphor regardless of whether they also had autism or not. Ability with a first order ToM task did not predict whether a child would pass the metaphor task. She therefore proposed that at least some of the pragmatic deficits characteristic of autism (i.e. difficulty with non-literal language such as metaphor) may be attributable to the linguistic deficit and not autism. As the Happé Strange Stories include stories that investigate understanding of figurative and non-literal language it is possible that difficulties with these tasks will be more attributable to the child's language deficit rather than their lack of pragmatic understanding. This is considered in the current study.

3.4.1.3 Scale of Theory of Mind (Wellman & Lui, 2004)

As introduced earlier in this chapter (3.1.3), another assessment of social cognition for older children is Wellman & Lui's (2004) Scale of ToM. Wellman & Lui (2004) demonstrated that children's performance on social cognition tasks is scalable, devising an assessment composed of five tasks that have been calculated to be passed in a particular order by typically developing children. These are: (1) diverse desire, (2) diverse belief, (3) knowledge access, (4) false belief and (5) hidden emotion. They tested it on 75 typically developing children aged between 2;11 years to 6;6 years.

This scale was used by Farrant et al (2006) to investigate social cognition in children with LD, aged approximately 5 years old, making comparisons with an age matched typically developing group. Their group with LD did not pass even the comprehension questions in the Hidden Emotion task, suggesting that they had difficulties with the information processing and narrative comprehension demands of the task. This task was therefore excluded from their analysis. They found that the LD group were also much less likely to pass the false belief task than the control group with only 10% passing compared with 65% of the control group. Therefore they concluded that children with LD were delayed in social cognitive development.

Again though, as with the above studies they failed to provide sufficient information about the types of language difficulties their participants presented with. Participants were selected through having a place at a Language Development Centre that

required them to have a “primary language disability in the presence of normal nonverbal intelligence” (Farrant et al, 2006, p1845). However there was no assessment of language as part of the study and thus no information about their levels of expressive, receptive or pragmatic language ability (or indeed nonverbal cognitive skills). Farrant et al (2006) call for more research that investigates which aspect of language is the more important for passing ToM tasks: representational (structural) language or the communicative (pragmatic) aspects of language (relating to the discussion earlier in this chapter in 3.2.2). The fact that the vast majority of their participants with LD failed the fourth task and all failed the final task made this an appropriate choice for older age group in the current study.

Use with other populations

Peterson, Wellman & Lui (2005) used this scale with children with autism and deaf children to investigate whether they pass the tasks in the same order as typically developing children. They included a sample with a very wide age range (3;6 years to 13;7 years), though state that no child with a verbal mental age less than 4 years was included. They found that children in the native signing deaf group (mean age 10;67 years) and late signing deaf group (mean age 10;0 years) did pass the tasks in the same order as the younger typically developing group. In the group with autism (mean age 9;3 years), however, the order of passing the final two tasks was reversed. Children in this group were more likely to pass the Hidden Emotion task before the False Belief task. They suggest that this provides evidence that the autistic group are processing the task differently. Peterson et al (2005) changed the wording of the final task (as it was used by Farrant et al, 2006) as they felt it was unnecessarily complex. Farrant et al (2006) note this and recommend that any further investigations of children with LD in this task should use this simplified version.

3.4.1.4 Second order ToM

The third assessment of social cognition that is commonly used with this age group (as raised in 3.1.3) is the second order ToM task (Perner &Wimmer 1984; Sullivan et al 1994). The study by Farmer (2000) discussed above (3.4.1.1), seems to be rare amongst studies of children with LD in using this task. They found some of their participants with LD (those at Special School) performed significantly poorer than their typically developing groups. This task was therefore also included in the current

study, due to the intention to compare ability across more than one assessment task.

3.4.2 Limitations of research to date

The above discussion has raised some issues with research into the social cognition of children with LD to date. Firstly, as discussed in Chapter 1 (1.6.3) there are issues around the concept of SLI as a diagnosis. Thus a major problem with many studies has been around whom they include (and exclude) and unavoidably results in considerable heterogeneity within a group of children identified with SLI. As a result there are issues about grouping these children together and making generalisations about their abilities. Some studies have attempted to address this by only including children with particular types of language difficulties (Farmer, 2000; Gillott et al, 2004), however as was discussed there is a lack of assessment information regarding nonverbal cognitive ability and a full range of language skills. Future studies should include assessment in these areas. In the current study (as discussed in 1.5.4), the inclusion criteria for the group of boys with LD are broadly defined and the group is recognised to be heterogeneous. This allows for consideration of which aspect of communication (or nonverbal cognition) is most closely associated with performance in social cognition tasks. Farmer (2000) did investigate correlations between performance in some assessment of language and short term memory with the ToM tasks she employed, but the language assessment was limited in that it only investigated receptive vocabulary and sentence recall. As stated, there is a need for a fuller assessment of language skills.

Secondly there is a need to consider our increased awareness of pragmatic language difficulties amongst children with LD (Bishop, 2003) and the recognised blurred boundary between LD and ASD (Bishop & Norbury 2002), as discussed in Chapter 1 (1.6.3). In light of this increased awareness, in recent years we have improved the ability to assess pragmatic language skills through the development of the Children's Communication Checklist (Bishop, 1998, 2003). As discussed in 3.2.2 in their review of typically developing children Milligan et al (2007) looked only at studies that investigated representational language skills as they reported a lack of standardised assessments of the communicative aspects of language. With the development of the CCC there is a tool that can give a standardised measure of pragmatic language skills (which relate to the communicative aspects of language).

This will allow us to consider the relative importance of representational (structural) versus pragmatic (communicative) aspects of language in the ability to pass ToM tasks.

A third issue is that studies have all included a mix of both boys and girls. As the current study includes boys only, this allows us to reduce variability due to gender.

3.5 PART 2: PEER RELATIONSHIPS IN CHILDREN WITH LANGUAGE DIFFICULTIES

Many of the underlying verbal and interaction skills required to form and maintain successful friendships have been found to be problematic for children with LD. Studies have shown that children with LD are generally less able than their typically developing peers to negotiate (Brinton, Fujiki & McKee, 1998), cooperate (Brinton, Fujiki & Higbee, 1998), access and participate in an ongoing interaction (Brinton, Fujiki, Spencer, Campbell et al, 1997, Liiva & Cleave, 2005) resolve conflicts (Stevens and Bliss, 1995) and to recognise and understand the emotions of others (Spackman, Fujiki & Brinton, 2006). Not surprisingly, considering these difficulties with the underlying skills, a lack of friendships has also been reported in children with LD (Fujiki, Brinton, Hart & Fitzgerald, 1999; Asher and Gazelle, 1999; Durkin & Conti-Ramsden, 2007).

3.5.1 Variability in friendship skills of children with LD

Language skills would be expected to play a major role in an individual's ability to form and maintain friendships as it is clear that talking, listening and responding constitutes a major part of friendship (Asher & Gazelle, 1999). It can be argued that having difficulty with language would put a child at a disadvantage when forming peer relationships and it does seem to be the case that children with LD are *more likely* to have difficulty with the component skills for friendship (as outlined in 3.5), however this is not the case for all children with LD. A number of studies have indicated that some children with LD do form successful friendships. A notable study carried out by Durkin & Conti-Ramsden (2007) found that a substantial number (60%) of their participants with LD did have good friendships. Other studies have

also shown that some children with LD achieve high levels of peer popularity (Fujiki et al, 1999; Brinton & Fujiki, 2002), illustrating the heterogeneity of this group. There is also some evidence that the difficulties experienced by some children with LD in social situations such as negotiation go beyond what you would expect from the limitations in their language skills (Brinton, Fujiki & McKee, 1998).

Durkin & Conti-Ramsden (2007) investigated factors that predicted friendship status amongst adolescents with LD. They found that when they looked at their sample longitudinally, receptive language skills at age 7 years were most predictive of difficulty with friendships at age 16 years. They use this as support for research that has been indicative of early language problems being predictive of persistent social difficulties over the long term.

A better understanding of what accounts for the variability in friendship skills of boys with LD is important when we consider the potential impact a lack of friendships may have in emotional wellbeing and externalising behaviour. Friendship provides a buffer and support for emotional wellbeing and a lack of friendships is recognised to have a major and enduring impact on self esteem and wellbeing (Hartup, 1999). As raised in Chapter 2 (2.1.3.4), it is recognised that children who experience significant difficulties forming and maintaining friendships have less opportunity to practice their social interaction skills. As a result these children are at risk of entering a negative cycle in which there is widening gap in their abilities and their peers, (Dodge et al 2003). These children are at heightened risk for a number of problems including emotional difficulties (anxiety and depression) and later anti-social behaviours such as substance abuse and delinquent behaviour (Dodge et al 2003). Recently there has been interest in using peers to help support pupils with LD and other Additional Support Needs (e.g. Newton, Taylor & Wilson, 1996; Deater-Decker 2001, Newton & Wilson 2003) in both their participation and social inclusion as well as to aid the development of their communication skills. In order to do this successfully it is important that we understand more about the underlying reasons for difficulties pupils with LD have when forming friendships.

3.5.2 Areas for future research

What is it that makes some children with LD have successful friendships? Why should children with receptive language difficulties have such enduring difficulties

with social relationships? Durkin & Conti-Ramsden (2007) suggest that it may be because poor receptive language ability is associated with poor social cognitive development which in turn impacts on social relationships. As Durkin & Conti-Ramsden (2007) recognise, their study lacked assessment of social cognition or pragmatic language skills in order to investigate the importance of these aspects of ability. Certainly difficulties with friendship and the skills required indicate a difficulty understanding others' perspectives and motives behind their behaviour, in other words social cognition. However we still do not have evidence for the relative roles of different aspects of ability. More knowledge is required regarding the interrelation of language and communicative skills, social cognitive development and quality of friendships of school aged children to shed light on the reason for this variability.

3.6 PART 3: SOCIAL COGNITION IN BOYS WITH EXTERNALISING BEHAVIOUR

A number of studies have been carried out into the social cognition of children with EB. Most have aimed to investigate how the interpersonal difficulties of these children should be explained (Happé & Frith 1996; Hughes, Dunn & White, 1998). However, as has been discussed in 3.1, social cognition is a broadly defined concept and particularly in middle childhood includes a wide range of abilities as cognitive functioning generally become more complex. It follows that studies with this population have used a very wide range of assessment tasks and defined social cognition is slightly different ways. This seems to be even more the case for studies investigating ability amongst children with EB than children with LD. There is little cross over in the social cognition assessments that have been used with these two populations and therefore limited research that has used the social cognition tasks discussed in this chapter with children with EB.

A number of studies (notably first carried out by Dodge & Coie, 1987) have looked at Social Information Processing, considering this an aspect of social cognition (e.g. Crick & Dodge 1994; Crick & Dodge 1996; Coy, Speltz, DeKlyen & Jones 2001; Dodge et al 2003, Bauminger, Edelsztein, Hany & Morash 2005; Zadeh, Im-Bolter & Cohen, 2007). Social Information Processing tasks are complex as the child is presented with a hypothetical social situation and is requested to verbally provide a

response as to how they would act in that situation. This task therefore requires the child to (1) encode the social cues, (2) mentally represent and interpret the cues, (3) clarify the goals, (4) search for possible social responses, (5) make a response decision after evaluating the consequences of various responses and estimate the probability of a favourable outcome and finally (6) in real life situations act out the selected response while monitoring its effects on the environment and regulating behaviour accordingly (Crick & Dodge, 1994). To this (in the case of an assessment task rather than a real life situation) we can add verbalising their chosen response and the reason for it in replace of (6). This is therefore a complex task that puts considerable demands on information processing and language abilities. It was decided that it would be very difficult for the participants with LD in the current study due to their language limitations (rather than necessarily their social cognitive ability) and was therefore not selected as an assessment of social cognition in the current study. However it should be noted that an interesting finding from studies using the Social Information Processing tasks is that they have consistently shown that children with EB are more likely to wrongly attribute hostile intentions to others in neutral situations and therefore they in turn are more likely to respond with inappropriate hostility. The following section will specifically discuss research that has investigated the aspects of social cognition considered in the current study.

3.6.1 Research that has used the tasks in the current study

The majority of studies that have used ToM tasks have been with preschool children. These will be discussed first, followed by a review of the limited research with school aged children with EB.

3.6.1.1 Preschool children

A major finding of research with preschool children links in with the findings of studies investigating Social Information Processing, discussed above. That is, children with EB have been found to be more likely to attribute negative rather than positive intentions of others. For example, Hughes, Dunn & White (1998) presented school children with EB (what they termed “hard to manage” children) with a battery of first order ToM tasks in which some involved deception with a nice or nasty surprise element. They found a modest delay in disruptive preschoolers’ social cognitive development and an uneven profile in performance in tasks that involved either “nice” or “nasty” surprises. Whereas in typical development children are more

likely to understand pleasant surprises before unpleasant ones (Wellman & Banerjee 1991), their group with EB did not follow this pattern; with more participants recognising the nasty surprise earlier than the nice one. They also found that overall, their “hard to manage” group were less able in the false belief tasks. In order to consider reasons for this difference Hughes et al (1998) did include a measure of language skills but this was only a measure of receptive vocabulary. They found that both in their typically developing Control group and their EB group performance in the ToM tasks correlated moderately with vocabulary score. However though this points to an association between ability with this task and language skills, language is of course far more complex than what is measured through vocabulary understanding. A composite measure of language and a measure of nonverbal cognitive skills would have improved the study design.

Badenes, Estevan & Bacete (2000) investigated the abilities of children aged 4 to 6 years old who had been rejected by their peers. As discussed in 2.1.3.4, there are close links between peer rejection and social isolation and EB (and internalising difficulties) however this does not mean that all children in their study will have EB and their group is limited in the comparisons that can be made to the participant group in the current study both by age and presentation of difficulties. However as they used the Happé Strange Stories (Happé, 1994) this study is of interest. They found that this group generally did not have difficulty with these stories compared with their typically developing peers but did report a difference in ability with one of the stories, White Lie (see Appendix I) and a tendency to attribute a hostile bias. They suggest that this perhaps provides some evidence for what they term a “theory of nasty minds”. In other words these children do not seem aware of the social expectations of lying to spare someone else’s feelings.

3.6.1.2 School aged children

Though fewer than for preschool children, there have been some studies that have investigated ability in school age children. Charman, Carroll & Sturge (2001) investigated ability in a typically developing group versus a group with ADHD (n=22 in each) aged 8 to 10 years with an advanced ToM assessment battery. This assessment battery included a second order ToM task and one that investigated the ability to make a distinction between a joke and a lie. They found no difference in ability between groups. This is surprising considering what we know about the links

between LD and EB (particularly ADHD), as discussed in 2.6.1. It would perhaps be expected that due to language limitations alone the ADHD group would score lower.

A second study of interest by Happé et al (1996) investigated social cognitive ability of children with a diagnosis of conduct disorder (n=18) aged between 6 and 12 years old compared with a group of their typically developing peers (n=8). They found some evidence for this group with conduct disorder performing more poorly in the Happé Strange Stories. They proposed that this provided some evidence for their difficulties with social interaction being attributable to limitations in their social cognition. However, again there are some major limitations to this study. Firstly, group sizes were very small limiting the generalisations we can make from these findings. Secondly, they did not include an assessment of language skills. We therefore do not know the extent difficulties with these tasks were due to language limitations.

3.6.2 Areas for research

It is expected that participants with EB will have significant pragmatic language difficulties, if the study (Mackie & Law 2010) is replicated. If this is found, questions arise regarding the underlying reasons for these and whether this is linked with limited social cognition. This is not the first study to consider reasons for the social difficulties that children with EB present with and, as discussed in this section, other studies have investigated their social cognitive skills. However, a wide range of assessments of social cognition have been used with these children, and the evidence regarding their social cognitive skills is limited and not conclusive.

Two notable omissions are as follows. Firstly research into the social cognition of children with EB has not fully considered either the language skills of their participants or the language demands of their tasks. Throughout this literature review the high level of co-existence of LD and EB has been discussed, however most studies do not fully recognise the high incidence of LD within this group with EB and therefore do not fully consider this in their study design. It is likely that one reason why children with EB may have difficulty with these tasks is due to their inability to fully comprehend the scenarios and/ or difficulties formulating an appropriate response. Though some studies have included a measure of verbal abilities these have been limited in the range of language skills they assess and a composite language assessment is more appropriate. The tasks used should also

be considered carefully for their language demands and these should be supported as much as possible, for example through the use of picture supports, consideration of the grammar, syntax and vocabulary and comprehension checks with opportunities for repetition. This will allow us to be sure that tasks are as accessible for participants with LD as possible. The current study's design allows for comparisons in performance in tests of social cognition amongst participants with EB, with or without LD. This will allow for consideration of whether difficulties with the task can be explained by limited language skills, and whether the presence of EB is associated with a different response.

3.7 CHAPTER SUMMARY

This chapter was split into three parts and provided a review of the literature on social cognition relevant to typically developing children, children with LD and children with EB. The assessment tasks commonly used with this age group have been introduced and discussed. The limitations of research to date have been discussed with areas for future research identified. In the next chapter the research questions are presented.

CHAPTER 4: RESEARCH QUESTIONS

This study aims to further our knowledge in three connected areas. Firstly investigations will be carried out into strengths of association between EB and other variables known to be closely linked with either EB and/ or LD. Though the high co-existence of LD and EB is recognised (as discussed in Chapter 2; 2.5), studies to date have not considered the strength of this association, while controlling for other variables. As discussed throughout Chapter 2 there are aspects of the environment which have been identified as being closely linked with EB; many of these are also associated with LD. It may be that the association between one or more of these variables and EB is closer than the association between LD and EB. This study will therefore include measures of selected aspects of the environment in order to investigate this. Likewise there are aspects of child ability that are known to be closely linked with LD (and EB). As discussed in 2.6.2.2, previous studies have rarely included a measure of non-verbal cognitive skills and therefore it is not clear whether it is LD specifically that is linked with EB or whether the link is between EB and general learning difficulties. Likewise there is some evidence discussed in 2.6.2.1 (Tomblin et al, 2000) that the link between EB and reading difficulties is stronger than that between LD and EB. This will therefore also be controlled for. Particular attention will be paid to the association between EB and pragmatic language skills due to recent research indicating high levels of co-existence between the two, as discussed in 2.6.2.3. It may be that, following the pilot study (Mackie & Law 2010) there is evidence for a closer association between pragmatic language difficulties and EB than between LD and EB.

Secondly there is a focus on social cognition. Due to the inconclusive nature of research to date discussed in Chapter 3, investigations are made into the social cognition and friendship skills of boys with LD. Previous studies have not sufficiently recognised the heterogeneity within a group of children with an SLI diagnosis. This study will aim to rectify this through recognising the range of presentations within a group with LD and considering the strength of association between aspects of communication and nonverbal cognitive skills and ability in social cognition tasks. Additionally it is recognised that there is considerable variability in the friendship skills of children with LD, but as discussed in 3.5, the reasons for this remain

unclear. This study will therefore consider which aspects of the child's ability are most closely associated with friendship skills. A better understanding here will feed into our understanding of EB due to the high proportion of boys with EB who have coexisting LD.

Thirdly, the focus returns to the boys with EB and investigates their performance in tests of social cognition. The reasons for any differences found in their ability with social cognition tasks when compared with the typically developing control group will be investigated. It is proposed that difficulties with these tasks may be due to the high proportion of boys with EB who have co-existing LD.

The research questions are as follows:

PART 1

Question 1: Can we demonstrate a closer association between pragmatic language skills and EB than between LD and EB while controlling for other variables that are recognised to be closely associated with LD and /or EB?

Hypothesis 1: Based on the evidence reported in the literature it is predicted that pragmatic language skills will be more closely associated with EB than LD, though a close association between LD and EB will also be found. This association will be closer than for the other variables measured.

PART 2

Question 2.1: How do boys with LD perform in assessments of social cognition compared with typically developing boys matched for age and SES?

Hypothesis 2.1: based on the evidence reported in the literature it is predicted that the group with LD will score significantly lower than the Control group in tests of social cognition.

Question 2.1.1: What predicts performance with these tests? Is it severity or type of LD, their nonverbal cognitive skills, pragmatic language ability or age?

Question 2.1.2: Is there evidence that boys with LD can perform well in tests of social cognition despite their limited structural language skills?

Note: due to the lack of previous research in this area there is no hypothesis for this question.

Question 2.2: How are boys with LD rated for their ability to get on with their peers compared with a typically developing control group?

Hypothesis 2.2: based on the evidence reported in the research literature it is predicted that the group with LD will be rated as having significantly more difficulties relating to their peers than the control group.

Question 2.2.1: Are receptive language skills most predictive of friendship rating (as found by Durkin & Conti-Ramsden, 2007)? Or are pragmatic language skills or social cognition more closely associated?

Hypothesis 2.2.1: based on the evidence presented by Durkin & Conti-Ramsden (2007) it is predicted that a close association between receptive language skills and friendship rating will be found, however due to the nature of pragmatic language skills it is predicted that the association with pragmatic language and friendship rating will be closer. A close association between rating of peer relationships and social cognition test performance is also predicted but due to the lack of research in this area is it not predicted whether this will be closer than for pragmatic language skills.

PART 3

Question 3.1: How do boys with EB score in social cognitive assessments compared with boys with LD (with or without EB) and a typically developing control group?

Question 3.1.1: Is a poorer performance in tests of social cognition amongst boys with EB due to a high rate of LD?

Hypothesis 3: based on the evidence reported in the research literature it is predicted that boys with EB will score lower in tests of social cognition than the control group. Consideration of the language skills of this group will show that language ability is associated with a lower score in these assessments.

CHAPTER 5: METHODOLOGY

This chapter is divided into three parts; the first reflects on the theoretical issues and rationales involved in the design of the methodology. In this section information will be presented on the assessment of language, pragmatic language, externalising behaviour, literacy, non-verbal cognition, social cognition, parenting stress and SES. This section will include, where available, information about test validity and reliability using information from Boyle & Fisher, 2007. The second part will detail the data gathering process. The third part will explain the statistical procedures used and the reasons for selecting them.

5.1 RATIONALE FOR SELECTION OF ASSESSMENTS

5.1.1 Measurement of language skills

5.1.1.1 *Assessment methods*

Most research studies which aim to investigate language skills in children make use of standardised assessments with normative data to compare outcomes with typically developing children. These measures are designed to ascertain typical, deviant or delayed language skills in children. There are other methods of measuring language such as language sampling where transcripts of the child's language are taken and analysed. This method provides rich qualitative information but is more limited by the extent one can make quantifiable comparisons with other children. The quantitative design of the current study meant that standardised assessment was therefore the most appropriate method for gathering information about the language skills of participants.

There are limitations with standardised assessment which should be noted. One issue is that the test situation is very different from real life communication settings and thus the information gathered may not be a true indicator of the child's functional language in real life settings. For example children with Asperger's Syndrome or high functioning autism can do quite well with standardised language tasks as they are highly structured, often supported by pictures and are mostly

presented one to one in a room with reduced auditory and visual distractions. However functionally they may have very poor communication skills. Other children, perhaps particularly those from low SES backgrounds may be uncomfortable with these settings and in fact have better communication skills than these tests indicate. Indeed some argue that these assessments are not always standardised on the full spectrum of SES, and thus are biased towards middle class children (see Ginsborg, 2006). However, despite this caveat, for quantitative research purposes such assessments remain the most appropriate method of gathering a picture of a child's language ability relative to his peers.

5.1.1.2 Choice of instrumentation

The criteria for the assessment selected were that it should be widely used in order to make comparisons with other studies and be meaningful for clinicians, and that it should be composed of a number of assessments of different aspects of language in order to make a composite measure. This is recognised to be a more accurate indicator of ability (Sparrow & Davis, 2000) and also recognises the multi-faceted nature of language. The Clinical Evaluation of Language Fundamentals – 4th UK Edition (CELF-4) (Semel, Wiig & Secord, 2006) was therefore selected. It is a frequently used assessment of expressive and receptive language development which is well standardised on a UK population, with some adaptations from the original assessment developed in the USA.

Furthermore, the standardisation procedures of the CELF-4 are good with test-retest reliability coefficients above .70 for all sub-tests and all age groups and inter-rater reliability above .90 for all sub-tests. Internal consistency is also good (Boyle & Fisher, 2007); as the composite scores are based on several scores and thus cover a broader range of language abilities their reliability is stronger than the sub-tests. Being the broadest composite score the Composite Language Scales (CLS) has the strongest reliability coefficients with all at .93 or above for all ages. The reliability coefficients of the other composite scores are also good: RLI .87 or above, ELI .91 or above for all ages. Studies of the reliability for clinical groups (language disorder, learning disorder, autism and hearing impairment) found the CELF to be equally reliable for these groups as in the wider population (Semel et al, 2006). Efforts have been made to ensure that the proportion of children of parents from different SES were appropriate to match those of society at large (where measure of SES was

parental education). As it was anticipated that a large proportion of participants in this study would be from low SES backgrounds this was considered important.

The CELF-4 is the first version of the CELF to allow the calculation of receptive and expressive composite scores and a core language score from 4 sub-tests. For the current study the main purpose of the language assessment was to get a good indication of expressive, receptive and overall structural language skills using a reliable measure. Therefore the complete CELF-4 was administered thus allowing the calculation of composite (and thus more reliable) scores than sub-tests alone. Measures of specific aspects of language beyond those measured in the CELF-4 were not required for this study and are therefore not included.

5.1.1.3 Format of the CELF-4

The assessment is composed of a number of subtests, the scores from which are summed to allow the calculation of a standardised Core Language score (CLS), a Receptive Language Index score (RLI) and an Expressive Language Index score (ELI) (standardised for age). The assessment varies slightly for children aged between 5 to 8 years and 9 to 16 years, in the sub-tests that are presented. For children aged over 9 years there are four sub-tests, *Concepts and Following Directions*, *Recalling Sentences*, *Formulating Sentences* and *Word Classes (Expressive and Receptive)*. For children under the age of 9 years, there are two further sub-tests required to calculate the composite scores, *Word Structure* and *Sentence Structure*. In each sub-test the child's raw score is converted for age into a standardised score. These sub-tests will now be described in turn:

Receptive language sub-tests

Concepts and Following Directions (for all ages): in this test participants were required to follow increasingly long and complex directions provided verbally by the researcher. The test involved pointing to picture displays in the test manual in particular orders. For example: "*point to the ball and the fish before you point to the shoe and the apple*". Directions are given once only.

Word Classes – Receptive: the participant is required to identify two words that are related from a choice of four words, for example "*popular disaster catastrophe*

marathon". There are no pictures or words displayed, though the 4 words can be repeated as required.

Sentence Structure (for children aged under 9 years): the participant is required to listen to a sentence and point to the picture that best matches its meaning from a choice of four. For example "*Mum showed the dog the cat*". The child is shown four pictures that differ slightly, mostly illustrating options that would match slight differences in the grammar or syntax.

Expressive Language sub-tests

Recalling Sentences: the participant is required to imitate sentences of increasing length and complexity presented verbally by the researcher. For example, "*the girl stopped to buy some milk even though she was late for school*". There are no pictures or other visual supports and the sentences cannot be repeated. Inability to imitate sentences is often used as a tool to discriminate between normal and disordered language development, and some propose its use as a psycholinguistic marker of SLI (Conti-Ramsden, Botting & Faragher, 2001).

Formulated Sentences: the participant is presented with a picture and is requested to make up a sentence about something in the picture using a word provided. It is designed as a test of ability to formulate complete semantically and grammatically correct spoken sentences of increasing length and complexity.

Word Classes 2 – Expressive: this subtest is presented at the same time as Word-classes 2 – Receptive, explained above. Once the participant has identified the 2 words that are related he is asked to explain *why* the words are related. The Word Classes sub-tests are designed to investigate the ability to understand and explain logical relationships in the meanings of associated words.

Word Structure (for children aged under 9 years): this test requires participants to complete sentences that elicit grammatical or morphological structures such as regular or irregular plurals, verb tenses, possessives and pronouns. The sentences are accompanied with picture supports. For example: a picture of one horse on the left and 2 horses on the right accompanies the verbal prompt "*here is one horse and here are two....*". The child is expected to complete the sentence by saying "*horses*".

5.1.2 Measurement of pragmatic language skills

As Adams (2002) states, the assessment of pragmatic language is problematic due to the complex interaction of social, linguistic, cognitive and cultural influences that are involved. A range of assessments have been developed and these can be divided into four categories:

- Published tests of pragmatic language
- Assessment of the comprehension of pragmatic language
- Coding systems of naturalistic assessment of interaction
- Published checklists or profiles

(Adams, 2002, p976). These categories will now be discussed in turn.

5.1.2.1 Published tests of pragmatic language

Published assessments of language sometimes have a component that investigates pragmatics (e.g. Assessment of Comprehension and Expression, ACE, (Adams, Cooke, Crutchley, Hesketh & Reeves, 2001). There are tests that investigate pragmatic language skills only, for example The Test of Pragmatic Language (TOPL), Phelps-Terasaki & Phelps-Gunn (1992). Although this test is designed to only investigate pragmatics however this is a complex test that goes beyond pragmatic language skills, in actual fact it also puts demands on semantics, vocabulary and verbal reasoning (Adams, 2002). Thus it can be difficult to determine the reasons why a child may be having difficulty with this test.

5.1.2.2 Assessment of the comprehension of pragmatic language

Formal tests designed to investigate comprehension of pragmatic language only, such as understanding ambiguity (e.g. The Listening Skills Test; Lloyd, Peers & Foster, 2001) are also prone to this issue of pinpointing the reasons for any difficulties with the test. Furthermore, as discussed in 5.1.1.1 regarding language skills, children with pragmatic language difficulties including ASD can do much better in a structured test situation than they do in real life settings. This questions the value of using such assessments with these children as it may give little information about their functional skills.

5.1.2.3 Naturalistic assessment

Assessment through naturalistic observation can give rich qualitative information about a child's functional pragmatic language skills, but as for other aspects of

language (discussed in 5.1.1.1) is limited as it does not allow direct comparison of ability with a child's peers and is very time consuming (Adams, 2002). It is therefore not suitable for use in quantitative research, such as the current study.

5.1.2.4 Checklists and questionnaires

Checklists and questionnaires are generally completed by the child's teacher and/or parent, and investigate their perception of the child's abilities in real life settings. This way of assessing pragmatic language has increasingly been favoured by both clinicians and researchers. There are a number of checklists that have been developed over the years, currently the most commonly used in the UK is the Children's Communication Checklist, first published in 1998 and now superseded by the CCC-2 (Bishop, 1998, 2003).

5.1.2.5 Choice of instrumentation

The CCC-2 was selected for two main reasons. Firstly it has been widely used in research that investigates pragmatic language skills (Gilmour et al 2004; Mackie & Law, 2010, Ketelaars et al, 2009). This allows comparison with these studies (though it should be noted that Gilmour et al, 2004 and Ketelaars et al, 2009 used the older version of the assessment). Secondly the CCC-2 is standardised on a UK population with efforts made to identify a spread of participants that match the UK wide population and thus considering SES. Internal consistency has been found to be reasonable (coefficient alphas ranging from .66 to .80) (Boyle & Fisher, 2007), though inter-rater reliability was found to be moderate to quite low between parent and teacher forms (coefficient alphas ranging between .29 to .53 for the sub-scale scores).

5.1.2.6 Format of the CCC-2

The CCC-2 is a checklist to be completed by a parent or a professional who knows the child well, such as his class teacher. Respondents are required to rate the child's ability with different aspects of communication from their perspective. The checklist consists of 10 subscales that investigate ability in: *Speech, Syntax, Semantics, Coherence, Inappropriate Initiation, Stereotyped Language, Use of Context, Non-verbal, Social Relations* and *Interests*. Thus there are:

- four sub-scales investigating the structure and content of language (*Speech, Syntax, Semantics and Coherence*)

- four sub-scales investigating pragmatics (*Inappropriate Initiation, Stereotyped Language, Use of Context, Non-verbal Communication*)
- two sub-scales that investigate skills beyond communication and look at social interaction skills. Thus these sub-scales are indicative of difficulties along the autism spectrum (*Social Relations and Interests*).

These 10 sub-scales are summed to give a composite standardised score called the General Communication Composite (GCC). There is also a score which distinguishes whether the pragmatic language difficulties a child has are disproportionate to their structural language skills, the Social Interaction Deviance Composite (SIDC).

In summary, Bishop (2003) states that the CCC-2 has three main purposes:

1. It distinguishes children with communication impairment from typically developing children through the calculation of the GCC.
2. It identifies pragmatic difficulties not typically picked up by other standardised assessment through the subscales listed above.
3. It identifies children whose pragmatic language difficulties are disproportionate to their structural language skills through the SIDC which "...provides qualitative information about the pattern of impairment, and is primarily used in research contexts, where one may want an objective method for subdividing children into subgroups. In a child with communication problems, values below 0 indicate a communicative style resembling that seen in ASD, whereas a positive score is indicative of more specific difficulties that disproportionately affect structural language skills" (Bishop, 2003, p19). This score is therefore intended to give an indication of social *interaction* difficulties of the type seen in autism rather than just investigating aspects of pragmatic *language* skills. Children whose scores indicate significant difficulty here should be further investigated for a possible diagnosis of ASD or Asperger's syndrome.

5.1.2.7 Development of the Pragmatic Language Composite Score

For the purposes of the current study our interest is in the extent and type of difficulties participants have with the pragmatic aspects of communication rather than whether their difficulties in these areas are disproportionate to difficulties with other aspects of communication. This is not one of the composite scores included

within the CCC-2. Therefore a Pragmatic Language Composite Score (PLCS) composed of the standard scores for the four sub-scales designed to investigate pragmatic language skills (i.e. *Inappropriate Initiation*, *Stereotyped Language*, *Use of Context* and *Nonverbal Communication*) has been calculated.

5.1.3 Measurement of reading skills

There are a number of assessments of literacy skills that investigate a range of aspects of reading ability. Many of these are part of a broader assessment of child abilities. Commonly used assessments in the UK include:

- the Neale Analysis of Reading Ability-Revised (NARA-II), Neale (1997) which measures reading accuracy, reading comprehension and rate of reading,
- the Weschler Individual Achievement Test, Second Edition UK (WIAT-II UK) (Weschler, 2005) which is a general assessment of cognitive skills and has a reading component that investigates reading comprehension and single word reading
- the British Ability Scales, Second Edition (BAS-2) (Elliot, Smith & McCulloch, 2004) again is a broad test of cognitive ability that includes a test of single word reading
- the Test of Word Reading Efficiency (TOWRE) (Torgesen, Wagner & Rashotte, 1999) specifically investigates single real word and non-word reading

5.1.3.1 Choice of instrumentation

Children with LD will commonly have reading comprehension limitations due, and corresponding, to their verbal language difficulties. These will be picked up in the assessment of verbal language. For this study's purposes our main area of interest is specifically word decoding skills. The TOWRE was therefore selected as it is designed for this purpose. Additionally it is quick to administer which is desirable for research purposes, particularly when (as in the current study) there are a number of assessments within the battery. One drawback is that the assessment is standardised on a US population, not the UK. However the standardisation is rigorous and the reliability and validity of the instrument is high with content reliability coefficients exceeding .90 for all age groups and test-retest coefficients above .98 and inter-rater reliability coefficients at .99.

5.1.3.2 Format of the TOWRE

The TOWRE is a measure of an individual's ability to read printed words accurately and fluently. The participant is required to read as many words as they can from a list in 45 seconds. There are two lists of words:

- 1) A list of real words of increasing length. This task investigates ability to recognise familiar words as whole units or sight words (though for younger children it is likely that they will use at least some phonemic decoding). Performance with this task allows the calculation of the Sight Reading Efficiency Score.
- 2) A list of non-words that are similar in structure to real words. This task investigates ability to phonemically decode unfamiliar words quickly and accurately. Performance with this task allows the calculation of the Phonemic Decoding Efficiency Score.

There is a third score, the Total Word Reading Score which is a composite of the above two.

The above two types of reading skill are both important in the development of overall reading ability. The words are presented individually and out of context so that they are as accurate an estimate as is possible of the child's ability to pronounce words on the basis of phonemic cues alone (Torgesen et al, 1999). Thus it gives a quick indicator of whether a child is behind the level that is expected for their age. The assessment does not give information about specific aspects of decoding that are causing difficulty, but this deeper level of information is not necessary for the purpose of this study.

5.1.4 Measurement of non-verbal cognitive skills

There are a number of domains of non-verbal cognition and a challenge for any non-verbal cognitive assessment is to consider a wide enough range of skills to be representative of ability (Daniel, 1997). Full assessments of nonverbal cognition are therefore often composed of a number of sub-tests. This is desirable but time consuming to present. One very widely used assessment of nonverbal cognition around the world are the intelligence scales developed by Weschler. In the UK the current version of the assessment is the Weschler Intelligence Scales for Children (WISC-IV UK), Weschler (2004). This is a full assessment that combines scores from a number of sub-tests (as is desirable) to provide a verbal and performance IQ

score as well as a full scale IQ score. The Wechsler Abbreviated Scale of Intelligence (WASI) (Wechsler, 1999) is linked to the Wechsler Intelligence Scale for Children, Third Edition (WISC-III; Wechsler 1991) and the Wechsler Adult Intelligence Scale–Revised (WAIS-III; Wechsler 1997). This is another very commonly used assessment of nonverbal cognitive skills for research purposes in the UK.

5.1.4.1 Choice of Instrumentation

Though the WISC-III is widely used and well regarded assessment of nonverbal cognitive skills, the time commitment required to carry out this assessment is not practical for most research purposes, including the current study and the shorter assessment, the WASI, was deemed more suitable. Screening assessments such as the WASI have primarily been developed for researchers who are looking to see the impact intelligence has on their results, mostly to rule out low cognitive abilities or to ensure that control and experimental groups do not differ significantly in cognitive skills (Sparrow & Davis, 2000). This is compatible with the purposes of the present study.

The subtests in the WASI differ from, but parallel, the item counterparts in the WISC-III and WAIS-III, except for the Matrix Reasoning which has no counterpart in the WISC-III. In the design of the assessment these sub-tests were chosen as they have the strongest association with general cognitive abilities and reliability and validity of the instrument have been found to be good, with strong correlations with the fuller WISC-III assessment which has been subjected to considerable validity testing. A limitation is the lack of a UK standardisation, as this shorter test is standardised in the USA.

5.1.4.2 Format of the WASI

The test has two verbal sub-tests (Vocabulary and Similarities) and two non-verbal subtests (Block Design and Matrix Reasoning). The two verbal subtests were not presented as full assessment of language and communication skills were already being carried out. The two non-verbal cognitive subtests were presented to obtain an indicator of non-verbal cognitive ability and are as follows:

Block Design: the participant is provided with a set of two-coloured cubes and is requested to replicate geometric patterns within a time limit. Each cube has 2 white sides, 2 red sides and 2 half red and half white sides. Initially the examiner models the required patterns for the participant to copy using the same style blocks starting with 2 blocks (if they are less than 9 years old) and building up to a 4 block, then a 9 block designs. It has been developed as a measure of perceptual organisation and general intelligence. Factor analysis indicates that the test taps into abilities related to spatial visualisation, visual-motor coordination, and abstract conceptualisation.

Matrix Reasoning: the participant looks at a matrix design in which a section is missing. He is requested to identify which pattern out of a choice of 5 will complete the design. Factor analysis indicates that it is designed as a measure of nonverbal fluid reasoning and general intellectual ability, tapping pattern completion, classification, analogy and serial reasoning (Weschler, 1999).

5.1.4.3 Training to administer the WASI

Training in the presentation and interpretation of the WASI is required for professionals other than Educational or Clinical Psychologists. Therefore the researcher was trained to present this assessment including how to deliver the instructions; when to query responses or repeat questions; how to score responses; and how to calculate composite scores by the second supervisor who is an Educational Psychologist by background.

5.1.5 Identification of externalising behaviour (EB)

There are a number of methods that have been developed to measure EB, which will now be discussed.

5.1.5.1 Clinical interviews

These are a valuable method of gathering rich qualitative information about an individual's presenting difficulties. However for research purposes they have limitations. As with language samples (as discussed in 5.1.1.1) they are time consuming and there are constraints on the extent one can make direct comparisons between a child and his peers because there is a lack of standardised information.

5.1.5.2 Self report

This is another commonly used method for investigating mental health issues including EB. Here the respondent rates himself on likert scales and forced alternative questions regarding aspects of functioning. This method can be useful for adolescents and adults but is rarely developed for children as young as in the current study. It is unlikely that children this age will yet have the capacity to self-reflect to the extent required (Goodman, Meltzer & Bailey, 2003). Their validity with children with LD is also questionable due to their potential additional difficulties comprehending and being able to formulate appropriate and accurate responses (Redmond, 2002).

5.1.5.3 Behavioural rating scales

Behavioural rating scales are highly suitable for research purposes, and indeed many view them as the “gold standard” in the research literature (Redmond, 2002). For the majority of rating scales, informants are teachers or parents and the scales represent their judgements about the child’s ability. Commonly used assessments are the Child Behaviour Checklist (CBCL) and the Teacher Report Form (TRF) (Achenbach, 1991a; 1991b) as used by Cohen et al, 1998; Redmond & Rice, 1998; Hart et al 2004. Concerns have been voiced however that there is a language bias within these (Redmond, 2002). Redmond (2002) reports that in the current version of CBCL there are items that could be construed as relating to their language, speech or learning. This could potentially cause children with language difficulties to be rated as having more significant socio-emotional issues than they actually do. For this reason and because of the length of the checklist (115 items) it was decided that this was not the most suitable checklist for the current study. Increasingly, the Strengths and Difficulties Questionnaire (SDQ), Goodman (1997) is becoming the assessment of choice when screening for SEBD due to its good psychometric properties and ease of presentation (Goodman, 1997, 2001). It is also favoured due to the inclusion of questions about the positive attributes of the child as well as the negative (Goodman, 1997).

5.1.5.4 Choice of Instrumentation

The SDQ was selected as an assessment of EB in the current study for three main reasons. Firstly it is widely used in research allowing comparisons to be made with other studies. It has been increasingly used by researchers over the last few years

in studies investigating SEBD in children (e.g. Hughes, White, Sharpen & Dunn, 2000; Fombonne, Simmons, Ford, Meltzer et al, 2003). This includes studies more specifically investigating the presence of SEBD in children with language difficulties or vice versa (e.g. Lindsey & Dockrell, 2000; Conti-Ramsden & Botting, 2004; Ripley & Yuill, 2005; Farmer & Olive, 2005). Secondly, the test has been standardised internationally and test validity and reliability has been found to be good, particularly for multi-informant responses. In a community sample of 7,984 children aged 5 to 15, taken from the British Child Mental Health survey, the SDQ identified individuals with psychiatric diagnosis with a specificity of 94.6% and a sensitivity of 63.3%. The questionnaires identified over identified 70% of children with conduct, hyperactivity, depressive and some anxiety disorders (Goodman, Ford, Simmons, Gatward et al, 2003). Thirdly it combines parent and teacher ratings so is not dependent on report from one perspective only.

Though the best choice for the current study it is important to note potential issues regarding the validity of checklists. Most notably there may be a “negative halo effect” where the informant rates the child more negatively across a range of aspects, simply because they possess characteristics that they view negatively. Secondly there may be issues regarding the reliability of response. Most ask respondents to make fine grained distinctions about the frequency, severity, duration or intensity of a behaviour. This may be very difficult for the respondent to do and may result in some lack of reliability (Redmond, 2002).

5.1.5.5 Format of the SDQ

The SDQ can be used with 3 to 16 year olds, and for the age range in the current study it is designed to be completed by parents and teachers. The questionnaire consists of 25 statements about the child for which the respondent has to indicate whether the statement is “*certainly true*”, “*somewhat true*” or “*not true*”. The statements investigate the following areas:

- Emotional symptoms
- Conduct problems
- Hyperactivity /inattention
- Peer relationship problems
- Pro-social items

The statements refer to positive as well as negative aspects of functioning. In addition it has an impact supplement in which the respondent is asked about their opinion of the effect these characteristics have on the child's functioning.

Table 5-1 illustrates the mean scores and standard deviations for the standardisation of the SDQ (Goodman, 2001).

Table 5-1: Means (and standard deviations) for British boys aged 5 to 10 years (Goodman, 2001)

SDQ – validation results (Goodman 2001)	Parent SDQ N=2954	Teacher SDQ N=2433
Overall stress	7.9 (5.4)	5.6 (5.3)
Emotional distress	2.0 (1.9)	1.5 (1.9)
Conduct difficulties	1.5 (1.5)	0.6 (1.3)
Hyperactivity/ attention	3.1 (2.5)	2.2 (2.4)
Peer difficulties	1.3 (1.6)	1.2 (1.7)
Pro-social skills	8.9 (1.4)	8.0 (2.1)
Impact on life	0.2 (0.9)	0.3 (0.8)

5.1.5.6 Scoring the SDQ

The SDQ is composed of five scales (as listed above). For all scales scores can range for 0 to 10 if all 5 items are completed. Scale scores can be prorated if at least three items are completed and the scales have been standardised. Parent and teacher scores on each scale are converted into bands for: “*close to average*”, “*slightly raised*”, “*high*” or “*very high*”. In each subscale except for the pro-social scale, approximately 80% of children score within the “*close to average*” range, 10% score in the “*slightly raised*” band and 10% in the “*abnormal*” range, split into approximately 5% each in the “*high*” and the “*very high*” bands. In the Pro-social scale this order is reversed with approximately 80% scoring in the “*average*” range but this time approximately 10% scoring in the “*slightly low*” band with 5% in the “*low*” and 5% in the “*very low*” ranges. The scores on these scales, excluding the pro-social scale are summed to give an Overall Stress score out of 40 for each respondent (i.e. one for parent and one for teacher). Again standardisation studies have allowed Goodman and colleagues to determine cut offs to indicated whether a child scores in the “*close to average*” (80%), “*slightly raised*” (10%), “*high*” (5%) or “*very high*” (5%) bands. The SDQ also includes an Impact Supplement in which scores can be summed to give a score out of 10 and again standardisation studies provide bands of “*close to average*” to “*very high*” (as above, and with the same cut-offs).

Information from the scales and the Impact Supplement completed by each informant are brought together into a computerised algorithm which calculates the risk of psychiatric disorder (Goodman, Renfrew & Mullick, 2000). The algorithm makes separate predictions for three groups of disorders, namely behavioural difficulties, hyperactivity/inattention difficulties, and emotional difficulties (such as anxiety or depressive disorders). Each is predicted to be *Low Risk*, *Moderate Risk* and *High Risk*. Predictions of these three groups are combined to generate an overall prediction about the presence or absence of any psychiatric disorder according the ICD-10 or DSM-IV classifications. Of particular interest in the current study is the category of behavioural difficulties and hyperactivity/ inattention difficulties which come under EB. EB as identified in the current study is determined as those participants who are scoring as at high risk of a diagnosis in either or both of these areas.

5.1.6 Assessment of friendship

A further advantage of the SDQ is that it includes a measure of parent and teacher ratings of the child's ability to get on with his peers. This is an area investigated in the current study and therefore added to the SDQ's suitability.

5.1.7 Assessing social cognition in middle childhood

The selection of assessments of social cognition have been discussed in 3.4.1. These are the Happé Strange Stories, the Scale of Theory of Mind and the Second Order False Belief task. This section will therefore focus on the administration and scoring of the tasks selected.

5.1.7.1 Happé Strange Stories

Administration

Ten stories were selected from Happé's (1994) set, one from each story type: *lie*, *white lie*, *misunderstanding*, *sarcasm*, *contrary emotions*, *pretend*, *joke*, *figure of speech*, *appearance/ reality*, and *forgot*. Two story types were omitted: the *persuasion story* (due to feed back from the Social Communication Intervention Project (SCIP) run by Cathy Adams for which data was being collected concurrently at the Centre for Integrated Healthcare Research. They had found that this story was too upsetting as it was about someone who was going to drown kittens), also

the *double bluff* story (again due to feedback from SCIP that this was too difficult for their participants who were of the same age range).

The examiner introduced the task by explaining: "*I am going to read some stories to you and then ask you some questions about the stories. I want you to listen carefully and then answer the questions at the end of each story.*" The child had the story read out to them. The story was also presented in front of the child in written form, with a cartoon, while the examiner read it out. See Appendix I for the test form and scripts for these stories.

Participants were then asked "*was it true what X said?*", followed by the second question "*why did X say this?*". Positive encouragement was given to the child's responses but there were no prompts and no direct feedback about the accuracy of the answer. The examiner wrote down the child's answers. Children were read the story once. If they responded "*I don't know*" or seemed unsure to the first question, or asked for it to be read again it was read a second time. This presentation is similar to that detailed by Happé (1994) and O'Hare et al (2009).

Scoring Procedure

The scoring was modified from Happé's (1994) original scoring procedure, following a method used by O'Hare et al (2009). The first question asked "*is it true what X said?*" with the answer yes or no expected. Happé (1994) used this as a test of comprehension, however similar to O'Hare et al (2009) it was found that this question did not give a real indicator of comprehension. Participants sometimes gave answers that indicated that they interpreted the question as true in a sense, that is it is not literally true but it is not untrue either (for example in the *figure of speech* story). Some children responded that it was "sort of true" or said "yes and no" for some of the stories. This is not incorrect and therefore, like O'Hare et al (2009), responses to the second question were the focus.

For the second question, the original scoring method developed by Happé (1994) put emphasis on whether the answer given related to the characters' mental states or to their physical state. As O'Hare et al (2009) and Happé (1994) state, the answers of most interest are those that refer to the characters' mental states as this is what the stories are designed to investigate. This answer should involve thoughts, feelings, desires, traits and dispositions (e.g. like, want, happy, cross, afraid, know,

joke, pretend, lie, fool someone, expect) and could be partial and thus get a score of 1, or full and accurate and get a score of 2.

Physical state answers would describe aspects such as a physical appearance, the action of the objects, physical events or outcomes. Children were always assigned a single score per story for their best answer (with mental state rated better than a physical state answer). As there is a possible maximum score of 2 for either physical or mental state for each story and 10 stories used, this gives a possible total Mental State score of 20 and Physical State score of 20. See Appendix I for the script and record form.

Table 5-2: Inter-rater reliability for the Happé Strange Stories

Happé Strange Story	Kappa score
Lie (dentist)	0.95
White lie (hat)	0.97
Misunderstanding (burglar)	0.95
Sarcasm (picnic)	0.91
Contrary emotions (painting)	0.89
Pretend (banana)	0.84
Joke (haircut)	0.89
Figure of speech (cough)	0.96
Appearance/ reality (Santa)	0.85
Forgot (doll)	0.95

Inter-rater reliability

In order to investigate inter-rater reliability of scoring, the percentage agreement between two raters was examined using Kappa scores. One rater had been involved in the scoring method developed by O'Hare et al (2009) and thus for each story the scoring criteria were discussed and approximately the first 15 responses were scored together. The two raters then completed scoring the stories individually and the responses were compared. Inter-rater reliability Kappa scores for each Happé Strange Story using the O'Hare et al (2009) scoring criteria are displayed in Table 5.2. As can be seen, reliability was good to very good, ranging from 0.84 to 0.97 (Boyle & Fisher, 2007).

5.1.7.2 Scale of Theory of Mind

Administration

The Scale of ToM developed by Wellman and Liu (2004) is comprised of five tasks as follows:

Diverse Desire assesses the child's understanding that two different people can have diverse desires about the same two objects. The child is shown a picture of two snacks and asked which snack he likes best. Then the child is introduced to Ryan and told that he prefers the other snack (which ever the child has not chosen). Then the child is told that Ryan can only chose one snack, and is asked to name which one Ryan would choose.

Diverse Belief assesses whether the child understands that two different people can hold different beliefs about the same two objects, even though the child does not really know which belief is true. The narrator explains that Emma lost her cat and that it is hiding in one of two locations. The child is asked which of the two locations he would look for the cat and is then told that Emma thinks her cat is in the other location (again which ever one the child did not name). Then the child is asked to say where Emma will look for the cat.

Knowledge Access assesses whether the child understands that a person who has not looked inside a container would not be able to know what was inside. The child is shown a box and is asked to make a guess about what is inside. The child is then shown that there is a snake inside. The child is then told that Emma has never seen inside the box; followed by being asked firstly if Emma will know what is in the box and secondly if Emma has seen in the box.

Contents False Belief assesses whether the child understand that someone who has not seen that there is an unusual object inside a container would think it contains the expected and usual contents rather than the unusual object. The child is shown a plaster box and asked what he thinks is in the box. He is then is shown that there is a spider in the box. The lid is closed and the child is asked to recall what is in the box. The character called Ryan is then introduced and the child is told that he has never seen inside the container. The child is asked to say what Ryan will think is in the box, plasters or a spider.

Hidden Emotion assesses whether or not the child understands that a person can feel one emotion internally while at the same time convey a different emotion on his face. The child is told that he will hear a story about a boy in which the boy might feel happy, sad or ok and is shown a picture of the back of a boy's head and

symbols representing each of the three emotions. A comprehension check is administered in which the child is asked to point to each of the three emotion symbols. The child is then told that he will be asked to tell how Matt (the boy) feels inside and how he looks on his face and that Matt may feel the same inside as he looks on his face or he may feel different from how he looks on his face. The researcher tells a story of how Matt's friends are laughing together and telling jokes and one boy tells a mean joke about Matt and everyone laughs, but Matt did not think that the joke was funny and did not laugh. The child is asked to recall (1) what the other children did when the boy told a mean joke about Matt (2) whether Matt thought the joke was funny. Using the facial expression symbols the child is then asked to indicate (3) how Matt really felt when everyone laughed at him and (4) how Matt tried to look on his face. Finally the child is asked (5) whether the can say *why* Matt tried to look the emotion that they indicated. To pass this task the child has to indicate that Matt's inner emotion is more negative than his expressed emotion and give some justification that indicated understanding. For the pictures, record form and scripts that went with these tasks see Appendix II.

Adaptation from Wellman & Lui's (2004) original version

The Hidden Emotion task is an adapted version of the original developed by Wellman & Lui (2004), following Peterson et al (2005). Question 5 is changed for the question used by Wellman & Lui (2004), which was "in the story, what would the other children do if they knew how Matt felt?" because of its length, conditional syntax and embedded phrase structure which posed comprehension problems. Farrant et al (2006) who used Wellman & Lui's original questions with children with LD noted that this was an issue and recommended that future studies should use the adapted version by Peterson et al (2005).

Wellman & Lui (2004) scrambled the presentation of their tasks in the following way, and this was followed in the current study:

- diverse desire or diverse content was presented first
- the Hidden Emotion task was presented next to last and the other three scrambled into three different sequences.

Scoring Procedure

Tasks were scored as follows, following the method used by Wellman & Lui (2004) with the adaptations made by Peterson et al (2006).

- Diverse desire scored correct (1 point) if the child answers the target question as the opposite from his or her answer to the own-desire question.
- Diverse belief scored correct (1 point) if the child answers the target question as the opposite from his or her answer to the own-belief question.
- Knowledge Access scored correct (1 point) if the child answers the target question “no” and answer the memory control question “no”.
- Contents false belief scored correct (1 point) if the child answers the target question “plasters” and answer the memory question “no”.
- Hidden Emotion scored correct (1 point) if the answer to “how does _____ feel?” question is more negative than the “how does _____ look?” question. (ie the child could indicate “sad” or “OK” for “how does _____ feel?”, and “OK” or “happy “ for “how does _____ look” question) and one point for an appropriate justification.

5.1.7.3 Second Order Theory of Mind

Administration

In the second order ToM task, the examiner introduces the task by saying she is going to tell a story about Ryan and Emma who are brother and sister. The participant is then told the following story supported by a comic strip style series of pictures. The child learns that Ryan and Emma have been given some chocolate to share and are told to put it in the fridge until their mother tells them they can eat it. They put the chocolate in the fridge and go out to play. Ryan comes in alone for a glass of juice. He opens the fridge, sees the chocolate, wants it all to himself and so takes it out of the fridge and puts it in his bag. Unknown to Ryan, Emma is looking in the window and sees everything that he is doing. At this stage the child is asked some questions to check for comprehension of the story. These are (1) “where was the chocolate first of all?” (2) “where does Emma see Ryan put the chocolate?” (3) “does Ryan know that Emma is at the window?” This third question checks comprehension of the linguistic form of a later question. The story is resumed and the child is told that Ryan goes back out to play and later their mum calls them both in for a snack. Emma and Ryan are told they can have some chocolate and mum asks Emma to get it. The child is then asked the question that investigates understanding of second order theory of mind, that is (1) “Where does Ryan think Emma will look for the chocolate?”, followed by the following questions to probe understanding (2) “Why does Ryan think that?” (3) “Where is the chocolate really?”

and (4) “Where was the chocolate first of all?” See appendix III for the script, record form and pictures that went with this assessment.

Scoring procedure

In order to pass this test, all comprehension questions have to be answered correctly, including the second order ToM question, “where does Ryan think Emma will look for the chocolate?”. Whether or not the participant passes the linguistic control question is also recorded as a pass fail (0 or 1).

5.1.8 Measuring parent stress/ wellbeing

Assessments of adult mental wellbeing are generally in the form of self-rated checklists and questionnaires. The inventories developed by Beck (such as Beck’s Depression Inventory (Beck, Steer & Brown, 1996), Beck’s Anxiety Inventory (Beck & Steer, 1993) are widely used within the UK. For the current study a measure more specifically relating to the parent’s wellbeing in relation to the parent-child relationships was required.

5.1.8.1 Choice of instrumentation

The Parenting Stress Index (PSI) Third Edition, Long form (Abidin, 1995) is designed to be an instrument in which the primary value is to identify parent-child systems that are under stress and at risk for the development of dysfunctional parenting behaviours or behaviour problems in the child involved. It is standardised for use with parents of children aged between 1 month and 12 years, and has been validated in the USA. Reliability and validity of the instrument are adequate (reliability coefficients range from .70 and .84 for individual subscales in normative sample with total scales for each domain all above .90). Though a caveat again is that this study has not been standardised on a UK population, the purpose and good standardisation of this instrument made it highly suitable for the purposes of the current study.

5.1.8.2 Format of the PSI

The assessment has two main components. The first, called the Child Domain, investigates the parent’s views of the child’s abilities as this is obviously a potential contributor to parenting stress. However, as information about the child’s strengths and difficulties has already been collected through the SDQ, these subscales were

not used in the analysis in this current study. The second component, the Parent Domain, investigates the parent's perception of their own wellbeing and performance as a parent. It is composed of the following sub-domains.

- **Competence**- investigates parent's feeling of being competent in their ability to manage their child
- **Isolation** – investigates social isolation from peers, relatives and other emotional support
- **Attachment** – investigates parent's sense of emotional closeness with their child
- **Health** – investigates whether the parent has had a deterioration of health that may be an additional independent stress on the parent-child relationship or the result of parenting stress
- **Role restriction** - investigates the extent the parent feels controlled and dominated by their child's needs rather than being able to maintain their own identity and freedom
- **Depression** – investigates for signs of clinical depression
- **Spouse** – investigates whether the parent is receiving emotional and practical support from the other parent in the area of child management

The assessment also investigates what is termed "Life Stress". Parents are required to indicate the number of stressful situational circumstances that have taken place in the last year in the immediate family. Different events are rated for their stressfulness. These events are ones that are often beyond their control and are outside the parent-child relationship.

Defensive responding

The assessment has a method for identifying whether the parent is likely to be responding in an overly defensive way and therefore whose responses are not a reflection of their actual levels of stress. The authors state that within the Parent Domain, "a Defensive Responding score of 24 or less indicates that the individual may be responding in a defensive manner and caution should be exercised in interpreting the remainder of the scores" (Abidin, 1995, p6).

5.1.9 Measurement of Socio-Economic Status (SES)

There are a number of methods for measuring social disadvantage or poverty, such as household income, parental employment, or education level (Ginsborg, 2006). For this study the prime reason for measuring SES was to have a reasonably accurate indicator of SES across the whole spectrum, rather than identifying families that were from socially deprived areas or backgrounds. The Scottish Index of Multiple Deprivation (SIMD) was selected as the most suitable measure for these purposes. Information about parental education and employment was also gathered for richer information about specific families. Of particular interest was maternal education.

5.1.9.1 Scottish Index of Multiple Deprivation (SIMD)

The SIMD is the Scottish Government's official tool for identifying small area concentrations of multiple deprivation across all of Scotland. SIMD 2006 divides Scotland up into 6,505 small geographical areas (called 'data zones'), with a median population size of 769. These are ranked from 1 (most deprived) to 6505 (least deprived) using 37 indicators of deprivation across seven categories or domains: current income, employment, health, education, geographic access to services, housing and crime. These zones, which are calculated from full postcodes have been categorised into deciles, with the 1st decile the least and the 10th decile the most deprived areas. It is available on the Scottish Government website.

5.1.10 Additional information gathered

The following information was also required for the data analysis and therefore were included within the Parent Questionnaire: Maternal education; adults at home, input from SLT and any diagnoses that the child had received.

5.1.11 Examiner information

All assessments were administered by the researcher who is a qualified SLT with over 12 years clinical experience.

5.2 DATA COLLECTION

5.2.1 Ethical approval

Ethical approval for the study was obtained from Queen Margaret University. Permission to undertake the research in Edinburgh schools was received from the City of Edinburgh Council, Children and Families department. However, the policy of the authority is to leave the final decision about participation in the research project to individual Head Teachers and their staff.

The researcher was carrying out the research as an employee of QMU, and participants were identified through information provided by the City of Edinburgh council. Therefore the project did not require access to any information from the NHS or involve any NHS employees. It was therefore not necessary to obtain ethical approval from the NHS and confirmation of this was received from QMU Ethics Board.

5.2.2 Recruitment method – Integration Support Audit

Permission to access the Integration Support Audit was granted by the City of Edinburgh Council. The Integration Support Audit is a list of all children in mainstream schools who are identified as having “exceptional needs”, where exceptional need is defined as having “additional, individual needs which cannot be met within groups or classes”. It is also required that their needs are long term and require additional adult assistance that is over and above what the school can provide by prioritising all available school resources, and over and above that which can be provided by support services. Allocation of additional support is therefore to support pupils whose needs cannot be met from other resources available to schools and takes the form of Learning Assistant hours.

Schools put forward pupils that they consider to meet the above criteria, including evidence to support their requests. They can discuss the appropriateness of their referrals with a Support Co-ordinator (who is closely involved in developing the Audit). Children are allocated a certain number of “audit hours” from the information provided by the school and the resources that are available across the city. Children’s primary area of need is recorded in the Audit. The classifications include:

- Lang & Comm (Language and Communication)
- SEB (Social, Emotional and Behavioural)
- L&B (Learning and Behaviour)
- Complex

Information about any diagnoses that the child has received was also included in the audit. These are only recorded where they have been made by a Paediatrician, SLT or other appropriate professional.

In this study we sought to have a community sample representative of boys with LD and/ or EB in mainstream education. Therefore potential participants were identified from the Integration Support Audit who were listed as Lang&Comm, SEB or L&B. Children with complex needs were excluded as this group generally had a combination of more obvious difficulties such as a syndrome, physical disability hearing or sight impairment combined with learning disability.

As the aim was to have boys in mainstream education presenting with either (or both) LD and EB, recruiting participants through this audit was highly suitable. This method was chosen over recruiting from SLT caseloads which would omit many children with LD who are non-attenders at clinic or have been discharged for other reasons by this age. It was also preferable to selecting boys with EB in specialist provision as the aim was to keep the participant group relevant for practitioners working in the mainstream setting, and with inclusion policy there are increasing numbers of boys with these difficulties within mainstream education.

5.2.3 Inclusionary and exclusionary criteria

Children recruited to the study were boys in Primary 4 to Primary 7 (approximately age 7 to 11 years old) at mainstream primary schools. To be included they had to have either significant EB or LD. These were measured as:

Language difficulties (LD): Scored below -1.25 SD (10th percentile) on the CELF CLS (Core Language Scale), in the CELF RLI (Receptive Language Index) or ELI (Expressive Language Index), thus including participants who had significant difficulties with expressive or receptive language only.

Externalising behaviour (EB): scored at high risk of a diagnosis of hyperactivity/ inattention and/or behaviour disorder in the SDQ (parent and teacher responses were combined)

Note: There were no exclusionary criteria relating to nonverbal IQ, to allow for consideration of the impact of differences in ability here.

Exclusions:

Boys were excluded from the group due to any of the following criteria:

- English was an additional language
- Identified hearing loss
- Moderate to severe articulation / phonological problems
- Hard neurological signs
- Looked after child (this is because the Parenting Stress Index asks questions relating to taking child home from hospital and other aspects of very early development)
- Diagnosis of autism spectrum disorder reported by the school

5.2.4 Approaching schools

Head teachers of primary schools in Edinburgh were sent a letter and information sheet about the project (Appendix IV). The letter requested permission to assess boys at their school who had been identified from the Integration Support Audit, and requested their willingness to assist through providing a quiet place within the school to carry out assessments one to one, and for the pupil's class teacher to fill out some questionnaires. They were also required to consent to help identify a suitable participant for the control group for each participant.

Consideration of the time pressure on a class teacher prompted the decision to minimise the amount of information that Class Teachers were asked to provide. They were also given the option for another member of staff who knew the pupil well to help or to complete the questionnaires for example the Learning Support teacher. The information gathered from class teachers was therefore limited to questionnaires that would take approximately 15 minutes to complete.

5.2.5 Approaching parents

Once Head Teacher consent was obtained, parents of potential participants were sent a letter explaining the project, how their child was identified and what they and their child would be asked to do. The wording of these letters was considered carefully. All parents were aware that their children were receiving additional support at school so it was explained that this was how they were selected. It was also made clear that they could drop out at any time and without giving a reason.

The letter informed them that they would receive a phone call in the next few days in which they could ask any questions and discuss further what it would involve. If they were happy to take part they were requested to return the consent form in the stamped addressed envelope provided. A meeting was then arranged at a place of their choosing (typically their home or their child's school) to complete the questionnaires. For some a meeting was arranged over the phone in order to complete the consent form as well as the questionnaires. This had the benefit of increasing the number of participants as it resulted in a higher return rate and made it easier for semi-literate/ non-literate parents to take part.

In the consent form parents were also given the option of receiving a summary of the assessments carried out with their child, whether they would like the school to be informed about these and their SLT (if they have one) or another professional. They were given a contact number to call if they have any concerns or queries following consenting for their child to take part. Schools were then contacted again to arrange times to assess pupils at their school, (see Appendix V for letter and consent form).

5.2.5.1 Control group recruitment method and criteria

For each participant a member of school staff would assist the researcher to identify another boy at the school for the control group who was:

- Within 3 months of age (+/- 3 months)
- Not receiving additional support through the Integration Support Audit.

Where this was not possible a boy was identified at another school in a similar SES area. Letters were sent out to parents, as before, explaining how their child had been identified, what the project was about and what they and their child would be required to do. As before, parents were telephoned to see if they were happy for their child to take part and to see if they had any questions. A meeting was then arranged and the school was contacted to arrange assessment times with their child (see Appendix VI for letter).

5.2.6 Withdrawing pupils

Though it is a regular occurrence in schools for children to leave the class to work with visiting services, and the researcher had experience of this in her previous role as an SLT, consideration was made regarding how to deal sensitively with singling pupils out who may already be aware and sensitive to being different. Both the school and parents knew the time the researcher was due to arrive so that they were able to inform the child in advance. If a child did not want to come out of class then this was accepted. Parents who raised concerns about how to explain the study with their child were informed that it was to help with a project that was taking place across many schools in Edinburgh to see how we can best help the boys who need a bit of extra support. When boys came out of class they were given information about the project as above. They were asked to tick a checkbox to indicate that they were happy to take part (Appendix VII).

5.2.7 Use of rewards, praise and breaks

Participants were made to feel relaxed and unrushed, as much as possible. The researcher provided an appropriate level of encouragement and praise and was sensitive to when the child was tiring. Short breaks were provided throughout the session as needed. A checklist of the activities to be completed in the session was used to help the pupil see how much more they were expected to do. This also ensured that the researcher kept to the correct order of tasks. At the end of the second session each participant was given a choice from a bag of items such as stickers, pens, rubbers, pencil sharpeners.

5.2.8 Pilot data collection

Pilot data were collected with six boys identified from the Integration Support Audit. One boy in this pilot group had Asperger's Syndrome; the rest all met the above inclusion criteria. The purpose of carrying out this pilot was as follows:

(1) To make sure system of sending letters, obtaining phone numbers, phoning parents and getting consent forms back worked.

The pilot data collection raised some issues with the clarity of letters to parents, and schools. Thus some aspects of the letters were rephrased. In particular it was made more clear that boys with ASD were to be excluded.

(2) Practice with assessments for timing

Originally it was attempted to complete the assessment battery in one session but this was far too long for one sitting. Therefore it was divided into two sessions of approximately 40 to 45 minutes which were much more manageable.

(3) Development of the questionnaires

- *Parent questionnaire*

The parent question was presented to three parents in the pilot group to check for timing and suitability of questions. Following this, some of the questions were revised as they needed to be more precise in order to code for data analysis.

- *Teacher questionnaire*

This was carried out with three class teachers. One question relating to friendship was omitted as information from the SDQ was considered more suitable.

Within the pilot data collection process, issues with the wording of the Hidden Emotion task in the Scale of Theory of Mind were also noted and some changes were made as described in 5.1.5.2.

5.2.9 Main data collection

5.2.9.1 Sessions with children

- *Location of testing*

All boys were assessed at their own school. Schools were asked to provide a quiet place (as much as is possible within a school) to carry out the assessments one to one. The participant was withdrawn from class either by a Learning Assistant, school administrator or Head Teacher in most cases. At other times, particularly on the second visit the researcher was directed to the classroom and introduced herself to the class teacher who then requested child to accompany the researcher.

- *Administration of assessments - order of tasks*

Three task orders were determined in order to ensure there is not an effect of tiring with some assessment tasks always being presented last. Alternatively, some tasks always being presented first could be affected by the participant being unsure and perhaps less full in their verbal responses than later in the assessment session

when he has become more confident in the assessment situation. Within these three orders the three orders for the Scale of Theory of Mind were also varied. Due to clinical experience of carrying out the CELF-4, the researcher was aware that it can be demanding and tiring for children and therefore the order of presentation was varied systematically and sub-tests of the CELF-4 were mixed in with other assessment tasks.

5.2.9.2 Assessment presentation orders

Three orders of presentation were devised and these were varied in a rotational basis based on scheduling of assessment sessions, as illustrated in Table 5-3. The Scale of ToM presentational orders were also varied as displayed in Table 5-4.

Table 5-3: Presentation orders of assessment tasks

Order A	Order B	Order C
1) Happé Strange Stories	7) Second order ToM	4) RS (CELF-4)
2) TOWRE	8) WC (and SS)	5) ToM scale – Order C
3) CF&D (CELF-4)	9) WASI	6) FS (CELF-4)
4) RS (CELF-4)	1) Happé Strange Stories	7) Second order ToM
5) ToM scale – Order A	Session 2	8) WC (and SS) (CELF-4)
Session 2	2) TOWRE	Session 2
6) FS (CELF-4)	3) CF&D (CELF-4)	9) WASI
7) Second order ToM	4) RS (CELF-4)	1) Happé Strange Stories
8) WC (and SS)	5) ToM scale – Order B	2) TOWRE
9) WASI (15 mins)	6) FS (CELF-4)	3) CF&D

Where a participant was less than nine years old, the researcher presented the Sentence Structure subtest following the Word Classes subtest and the Word Structure sub-test as the same time as Recalling Sentences. Though the CELF-4 CLS does not require the Word Classes Expressive to be presented for children under nine, the Word Classes-Receptive is required to gain the CELF RLI and therefore was presented.

Table 5-4: Presentation orders of the ToM scale, following Wellman and Lui (2004)

Order A	Order B	Order C
1) Diverse desire	1) Diverse desire	1) Diverse desire
2) Diverse belief	2) Knowledge access	2) Contents false belief
3) Knowledge access	3) Contents false belief	3) Diverse belief
4) Contents false belief	4) Diverse belief	4) Knowledge access
5) Hidden Emotion	5) Hidden emotion	5) Hidden emotion

Most participants completed all assessment within two weeks.

5.2.9.3 Equipment

- CELF-4, WASI and TOWRE assessment stimulus books and record forms.
- Pictures, box, plaster box, plastic animals and record forms for social cognition tasks.
- Stopwatch for WASI and TOWRE

5.2.9.4 Use of visual supports

The researcher provided a written checklist of what was to be done in each session so that the participant knew what to expect and how many tasks were left. This also ensured that the researcher presented all the assessments and in the correct order. The participant ticked off a box once the assessment task was completed (see Appendix VII). The social cognition tasks all had pictures to support the verbal information. This reduced the language and information processing demands of these tasks.

5.2.10 Assessment reports

These were sent to parent, school, SLT and or other professional as requested by the parent. The summary included an overview of each assessment's purpose, the children's standard or percentile scores and brief comments. The summaries did not contain information from the Children's Communication Checklist, Strengths Difficulties Questionnaire or Parenting Stress Index. Parents were requested to get in touch with the experimenter should they require this (see Appendix VIII).

5.2.11 Questionnaires for teachers

Where possible teachers received a verbal explanation of the project and the information required from them. There was a covering letter explaining what was required with contact details should they have any questions attached to the questionnaires (see Appendix XI). At times it was not practical to leave these directly with the teacher and on these occasions the questionnaires and covering letter were left with another member of staff such as the school secretary. They were requested to return the questionnaires to the researcher either in an attached stamped addressed envelope or when the researcher next came in to the school.

5.2.12 Meeting with parents

As stated, a meeting was arranged with parents in order to complete the parent questionnaires. Parents could choose whether they wished this to be at their home or at their child's school, or another location, for example, place of work. As much as possible parents were also informed of when the researcher would first be going in so that they could prepare their child. Meetings varied in whether they were before, between or after the assessment with their child. At the meeting parents were again asked if they had any questions about the project and were then asked to complete three questionnaires in the following order:

- 1) Parent Questionnaire (Appendix X)
- 2) Strengths Difficulties Questionnaire (SDQ)
- 3) Parenting Stress Index (PSI)

Parents were given the option of reading the questionnaires through together with the researcher in case they had limited literacy skills and would struggle with the literacy demands of these questionnaires. This was requested by some parents. It was found that some questions were a bit difficult for some of these parents to understand due to quite complex syntax and grammar and at times vocabulary and had to be rephrased, particularly in the PSI. The majority of parents completed the questionnaire on their own with no input from the researcher. However if they were unsure of questions the researcher was there to ask for clarification. Advice was given about responses; this was, as much as possible, consistent for all parents.

5.2.13 Procedure if referral to SLT was appropriate.

If the child's assessment results indicated significant language and/or communication difficulties and the child was not currently receiving SLT input, the summary to the parent (and school if requested by parent) reported that their scores indicated that a referral to SLT may be appropriate and to call to discuss this. As the researcher is a qualified SLT she was familiar with the procedure for doing this and when it would be an appropriate referral. As a result of the project, one child was referred to SLT. Three more were informed that a referral may be appropriate but did not call to discuss this.

5.2.14 Procedure if referral to CAMHS seems appropriate

On discussion with parents and examination of SDQ forms, if a child seemed to have significant SEBD and the parents reported that they were struggling and wished to receive greater support for these, the researcher was aware of how to contact Child and Adolescent Mental Health Services (CAMHS) to discuss the appropriateness of a referral. This was followed through for one boy who is now receiving support from their service. For another boy contact was made with CAMHS as, though receiving their input, his parents reported not hearing back from CAMHS regarding a diagnosis for some time and they had serious concerns about him at that time. This also resulted in further input being provided.

5.2.15 Data storage

Confidentiality of all personal data has been treated with importance. All data going onto the computer or kept in an unlocked file have been anonymised. Any personal information is kept in a locked filing cabinet or cupboard. Any emails, for example, to teachers did not include the names or identifying information about participants. Data will be stored for the required time period specified in the QMU guidelines that are in line with the Freedom of Information Act, following the completion of the project.

5.2.16 Feedback to schools

Schools were offered a presentation about the research project on request. All schools and the City of Edinburgh Council will also be sent a summary of the project's findings.

5.3 DATA ANALYSES

All raw data are analysed using the software programme SPSS for Windows 17 (SPSS Inc., 2009).

5.3.1 Significance levels

The alpha level of significance is set at $p \leq 0.05$; values slightly above the 0.05 level are reported as trends towards significance, to lessen the possibility of Type 2 errors.

5.3.2 Assumption of normality

Each individual analysis is chosen based on whether or not the assumptions of normality are upheld. For each variable judgements regarding normality were made through plotting frequency distributions (histograms) in order to investigate whether the data lay on the normal distribution curve and P-P Plots to investigate whether data deviates significantly from the diagonal for each variable. Where assumptions of normality are met, parametric analysis has been carried out. Where this assumption is seriously violated or where sample size is particularly small, analysis has been through nonparametric analysis (Field, 2009).

5.3.3 Choice of statistical tests

5.3.3.1 Identifying differences between groups: Non-parametric and parametric analysis

Parametric analyses of differences between group mean scores were undertaken using the independent t-test (two tailed). This test is used in situations in which there are two independent participant groups of similar size, the assumption of normality is met and the variances in both groups are similar. For each test, values for t , degrees of freedom (number of participants minus 1) and significance level are reported. Where these assumptions were not met due to marked problems, non-parametric analysis of differences between groups was carried out using the Mann Whitney test. This is the non-parametric equivalent of the t-test (Field, 2009). For each test values for the Mann Whitney U statistic, the z statistic and significance level is reported.

5.3.3.2 Chi Square

Comparisons between two dichotomous categorical variables were undertaken using the Pearson's Chi Square test. This test is used to compare the frequencies observed in certain categories to the frequencies you can expect to get in those categories by chance (Field, 2009). There are two important assumptions for this test. Firstly variables entered must be independent of each other, and secondly the expected frequencies should be greater than 5, otherwise statistical power is lost (Howell, 2006). This has occurred in a couple of instances in the following analysis and therefore, as statistical power is weakened, some caution is required in the

interpretation of this. For chi square analysis, the chi square statistic, degrees of freedom and significance level (value of p) are reported.

5.3.3.3 Correlations

Correlation analyses were carried out using the Pearson's correlation coefficient (Pearson's R) where assumptions of normality were met for both variables. Pearson's correlation coefficient also requires data to be interval. Where parametric assumptions were violated, correlation analysis was undertaken using the Spearman's correlation coefficient (Spearman's Rho), the nonparametric equivalent. In some instances it was necessary to investigate correlations between a dichotomous categorical variable and an interval measure. A point biserial correlation (Pearson's R) is the appropriate test in these circumstances.

5.3.3.4 Regression analysis

Regression analysis is undertaken in order to measure relationships between variables (Field, 2009) through building a model of the strength of association. For some analysis the relationship between two interval variables was of interest and therefore linear regression was undertaken to investigate the association between the dependent variable (outcome variable) and independent variable (predictor variable). For some of the analysis there was more than one predictor variable and therefore multiple linear regression models were employed.

For other aspects of the analysis the outcome variable was a dichotomous measure and therefore logistic regression was the appropriate statistical test. Again, for some analysis univariate regression models were built in order to investigate the association between a single predictor variable and the outcome variable, for other analysis the model was multivariate, that is more than one predictor variable was entered into the model to investigate their ability to predict the outcome variable. When carrying out multiple regression analysis a forced entry method was used. In other words, all variables were forced into the model simultaneously. This method is considered to be the most appropriate method of carrying out multiple regression by some researchers (see Field 2009, Tabachnick & Fidell, 2005). For both linear and logistic regression the predictor variables do not need to meet the assumptions of normality (Tabachnick & Fidell, 2005).

Assumptions for linear regression

In order to be able to generalise the findings of the model to a wider population, the following assumptions must be met:

- (1) Independent variables should have variation in value (i.e. variance should not be at or near 0)
- (2) There should not be multicollinearity between independent variables (i.e. they should not correlate too highly)
- (3) The independent variables should not correlate with variables that have not been included in the regression model as any conclusions drawn become unreliable
- (4) The variable of residual terms should be constant (that is the variance of residuals at each level of the independent variable should be more or less the same). This is known as homoscedasticity.
- (5) For any two observations, residual terms should be uncorrelated.
- (6) Serial correlation between errors should be investigated through the Durbin-Watson test as residual terms should be uncorrelated. The Durbin-Watson test investigates whether adjacent residual values are correlated. Values should be close to 2; values much more than 2 indicate a negative correlation and below 2 a positive correlation.
- (7) Errors should be normally distributed, that is differences between the model and the observed data should be mostly near 0, indicating that the model residuals are random.
- (8) It is necessary for the values of the outcome variable to be linear.

Diagnostic tests for linear regression

Diagnostic investigations should always be carried out with this analysis. This allows for the consideration of outliers (i.e. cases that deviate far from the rest of the sample) and residuals (i.e. the difference between the value the model predicts and the value observed in the data on which the model is based) that may be affecting the model and thus how good or bad the model is for fitting the sampled data (see Field, 2009).

Reporting linear regression (univariate or multivariate)

The following values are reported:

R^2 : tells us how much of the variance in the outcome variable is accounted for in the regression model from the predictor variable

Adjusted R^2 : tells us how much of the variance in the outcome variable is accounted for if the model had been derived from the population from which the sample was taken.

F-ratio: tells how much the model has improved the prediction of the outcome compared with the level of inaccuracy in the model (degrees of freedom are also reported here with the significance level)

B (the unstandardised regression coefficient): indicates the strength of relationships between a predictor variable and the outcome variable, calculated as the change in outcome given a unit change in the predictor variable

Beta (β) (the standardised regression coefficient): indicates the strength of the relationship between the independent variable and dependent variable in a standardised form. This allows comparisons with other independent variables. As above it is the change in outcome given a unit change in the independent variable.

p: The significance level tells whether the value for Beta is significantly predicting the outcome variable (Field, 2009; Tabachnick & Fidell, 2005).

Assumptions for logistic regression

Again there are a number of assumptions that need to be met, that are shared with linear regression. These are:

- (1) Linearity: as the outcome variable is categorical it cannot be linear and the log of the data is calculated. Linearity is then assumed between any continuous predictor variable and the log of the outcome variable
- (2) The assumptions of independence of errors are the same as for linear regression. In other words the cases of data cannot be related.
- (3) The assumptions of multicollinearity are also the same as for linear regression.

Diagnostic tests for logistic regression

As for linear regression there are a number of diagnostic checks that need to be carried out to examine residuals for outliers for which the model fits poorly and isolate points that exert undue influence on the model (Field, 2009). The majority of these are the same as for linear regression.

Reporting logistic regression

The following values are reported:

Exp (B) (or odds ratio): this is reported with 95% Confidence Intervals. It is an indicator of the change in odds resulting from a unit change in the predictor variable. A value of greater than one indicates that as the independent variable increases, the dependent variable (or odds of the event happening) also increase. Conversely a value less than one indicates that as the independent variable increases the dependent variable decreases (and therefore the odds decrease). This is reported with significance levels which tell whether the independent variable has a significant effect on the outcome.

R² (model coefficient): Two values are reported, Cox and Snell and Nagelkerke. These are based on the log-likelihood of the model and the sample size. The log-likelihood is the probability of the event (dependent variable) happening for a participant.

Model Chi square (X²): this gives an indication of how well the model fits the data compared with the null model, that is the model before the predictor variable(s) was/ were entered.

5.3.3.5 Psychometric considerations

Standardised scores are used for across and between group comparisons where possible. The social cognition tests are not standardised, therefore comparisons involving this measure are undertaken using raw scores.

5.3.3.6 Missing data

There is some missing data, particularly for the parent and teacher completed checklists (CCC-2, SDQ and PSI). Missing data are coded as such in SPSS for fidelity in analysis. When comparisons between groups are made involving these measures, the option “exclude cases pairwise” is used in analysis in SPSS. This eliminates a participant only for a particular analysis where data are missing.

RESULTS

The Results section is split into three chapters. Chapter 6 starts with an introduction which provides information regarding the participant selection method, groupings and success of the matching criteria for identifying a Control group. It then focuses on the boys with EB and contains the analysis for the Research Question Part 1. Chapter 7 focuses on the boys with LD and contains the analysis for the Research Questions, Part 2. Chapter 8 returns the focus to the group with EB, though also considers those with LD. It contains the analysis for the Research Questions, Part 3.

CHAPTER 6: INTRODUCTION AND ANALYSES FOR RESEARCH QUESTIONS PART 1

6.1 INTRODUCTION

6.1.1 Identifying Groups

The Integration Support Audit listed 355 pupils across the city with exceptional needs. Of these, 260 were boys in primary 4 to 7 who had no record of ASD on the Audit. Schools were contacted in alphabetical order (as they are listed on the Audit) for their consent to take part. 29 out of 57 schools contacted agreed to participate. Once school consent was obtained, parents were then contacted for their consent. 48 boys were recruited and were assessed to identify whether they met the criteria for inclusion in the LD group and/ or the EB group following the selection criteria detailed in the Methodology (5.2.3). 43 of these boys met these criteria with only 5 boys who did not. These 5 were excluded from the analysis and their presentations were as follows:

- ❖ Four were classified as “Language and Communication” in the Integration Support Audit. They all therefore had a history of language difficulties but scored within the average range in the CELF-4. One boy was reported by his parents to have received a diagnosis of SLI.
- ❖ The fifth boy was classified as “Learning and Behaviour” in the Integration Support Audit. He scored within the average range for the CELF-4 and the WASI. His SDQ scores did not indicate high risk of a diagnosis, though in his teacher completed SDQ he scored high for hyperactivity and attentional difficulties and scored highly on the CCC-2 for pragmatic language difficulties. School reported that he needed and received a lot of additional support; his mother reported few or no problems.

6.1.1.1 A note on ASD

Though autism was listed as an exclusion criterion and this was discussed with the school when recruiting participants, two of participants were subsequently reported by parents to have received a diagnosis of ASD through the parent completed questionnaire (see Appendix X). As it is acknowledged that there is a considerable “grey area” on either side of a diagnosis it was decided to keep them in the analysis

as it seemed that their diagnosis must have been fairly borderline considering the school's apparent lack of knowledge. Their scores are considered compared to the rest of the participants. Furthermore, also fitting in with this "grey area" there were other participants who were due to attend for assessment as there were queries regarding whether they might meet the criteria for ASD and others who had attended for assessment but were considered to not quite meet the criteria for ASD. No participant was reported to have received a diagnosis of PLI however. It was felt that this question mark over some of the participants reflects the reality of a spectrum of ability and blurred boundaries between LD and ASD as reported by Bishop & Norbury (2002); see chapter 1(1.5). Rather than ignoring this and treating this group as homogeneous, the role of pragmatic language skills is considered in the analysis, with attention is paid to outliers and how these children fit in with the rest of the group.

6.1.1.2 Control Group

The control group was selected as described in the Methodology, section 5.2.5.1. In order to have a representative community sample, it was important that this group was not biased towards the children teachers thought were more able or whose parents were more likely to respond (and therefore perhaps a risk that these families may be of higher SES). Teachers were therefore asked to identify the two boys closest in age to a participant, with the caveat that they were not also on or about to be put forward for support from the Integration Support Audit. Where this was not possible at a school, participants for the control group were selected from a school in an area of similar SES. A total of 47 boys were assessed for the control group.

It is of note that at some schools teaching staff commented that it would be very difficult to identify boys who were not receiving additional support. Indeed assessments scores revealed that five boys selected through this process had significantly low scores on the CELF (sufficiently low to put them in the LD group) and / or their SDQ profile indicated that they were at high risk of a diagnosis of EB. This highlighted a limitation of the method of recruitment. The Integration Support Audit as a working tool was found to be quite flexible in how the support was actually provided for pupils at the school. Therefore it was quite possible for a child who was not on the audit to be receiving some additional support from the extra hours the school had been provided. It was also the case that some of the boys in

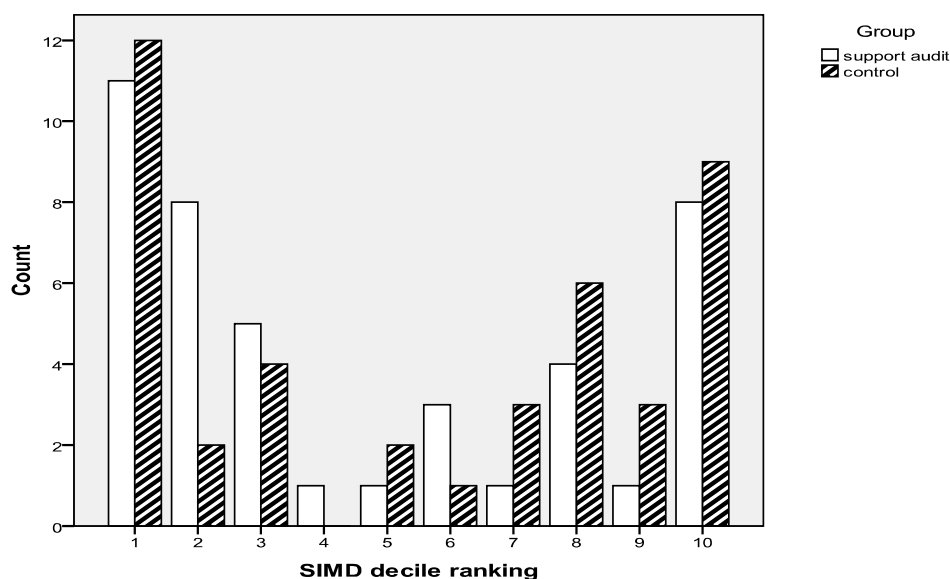
the control group were identified with LD through their CELF-4 scores, but did not seem to receive any additional support and whose difficulties had not been recognised. These boys were therefore apparently coping well despite very low language abilities. As the Control group was required to be a group of typically developing boys matched for age and SES, it was decided to exclude these boys from the analysis. This resulted in 42 boys in the control group being included in the final analysis. However it is of note that within the control group there is a boy who, though not on the Integration Support Audit, has a diagnosis of ADHD, controlled by Ritalin. His scores in the SDQ do not indicate that he is at high risk of a diagnosis of EB. Tying in with the discussion in Chapter 1, this highlights the lack of clear categorical distinctions amongst pupils in reality and how presenting difficulties can merge and overlap with each other and are also seen in the general population. Outliers will be investigated and discussed where appropriate.

6.1.2 Matching Criteria

6.1.2.1 Socio-economic status - SIMD

Figure 6-1 illustrates that the SIMD rankings of participants in the Support Audit group (median= 3.0) were similar to the participants in the control group (median= 6.5), $U=810.5$, $z=0.827$, $p=0.408$. Though there was a trend for participants in the control group to be from a higher SIMD ranking, this represents a small effect, ($r=-0.126$) and thus matching was successful on this criteria.

Figure 6-1: SIMD ranking of participants



6.1.2.2 Age

As intended, the Integration Support Audit group and the Control group were of very similar age, $t(83) = -1.01$, $p = 0.315$, and this is illustrated in Table 6-1.

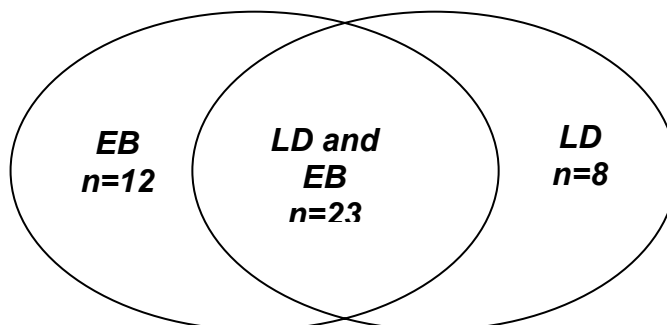
Table 6-1: Ages of participants

Age (in months)	Support Audit group (n=43)	Control group (n=42)
Mean	121.44	122.31
Median	120.0	122.5
Standard Deviation	16.22	13.99
Minimum	93	97
Maximum	153	146

6.1.3 Identification of sub groups

The selection method for identifying participants with EB and / or LD resulted in two groups which overlapped considerably, as illustrated in Figure 6-2. This high level of coexistence of difficulties can be interpreted in two ways: amongst boys with LD, 23 (74.2%) have coexisting EB and amongst those with EB, 23 (65.7%) have coexisting LD.

Figure 6-2: Identification of LD and EB groups



In the following three chapters these groups will be considered in the following ways. Chapter 6 will consider the EB group (n=35) which includes boys with LD (n=23). Chapter 7 will consider the LD group (n=31), and again this includes the group with combined difficulties (n=23). Chapter 8 will consider the differences between the three subgroups (LD only (n=8), LD & EB (n=23) and EB only (n=12) groups).

6.2 ANALYSES FOR RESEARCH QUESTIONS PART 1

In this section descriptive information will be provided regarding how the boys with EB performed in the tests of language, nonverbal cognitive skills, word decoding and pragmatic language in comparison with the typically developing Control group. This is followed by descriptive information comparing the EB and Control group for the environmental factors measured: maternal education, adults at home and parenting stress. Investigations are then made into the strength of association between pragmatic language difficulties and EB through regression analysis. Comparisons will be made with the strength of association with other aspects of child ability and aspects of environment as above.

6.2.1 Descriptive Information: Aspects of child ability

6.2.1.1 Emotional/ Behavioural Difficulties: SDQ

As explained in the Methodology the SDQ is composed of a number of subscales (Emotional Distress, Behavioural Difficulties, Hyperactivity and Attentional Difficulties, Difficulties getting on with other children and Pro-social skills). An Overall Stress score is calculated by summing these subscales, excluding the Pro-social skills subscale. There is also an Impact on Life measure which is calculated from the questions on the reverse of the form. Parent and teacher completed SDQ scores are reported for parents in Table 6-2 and teachers in Table 6-3.

Table 6-2: Parents' ratings in the SDQ for the EB and Control groups

SDQ scores	Overall Stress	Emotion	Behaviour	Hyper/inatten.	Peers	Pro-social	Impact on life
EB group (n=33) (2 missing)							
Mean	20.45	4.64	4.60	7.58	4.39	6.72	4.03
Median	20	4	5	8	5	7	4
S.D.	5.35	2.64	2.42	2.40	2.23	2.17	2.44
Minimum	10	1	0	3	0	1	0
Maximum	31	10	10	10	9	10	8
Control group (n=42)							
Mean	6.88	1.21	1.26	3.50	0.90	8.55	0.27
Median	6	1	1	3	0	9	0
S.D.	4.79	1.28	1.21	2.44	1.49	1.52	0.88
Minimum	0	0	0	0	0	4	0
Maximum	18	5	5	9	6	10	5

Scores in the parent completed SDQs are significantly lower in the EB group than the control group for all subscales (*Overall stress*, $t(71)=8.78$, $p<.0001$; *Emotional distress*, $t(71)=5.42$, $p<.0001$; *Behavioural difficulties*, $t(71)=5.67$, $p<.0001$; *Hyperactivity/ inattention*, $t(71)=5.861$, $p<.0001$, *Difficulty getting on with peers*, $t(71)=7.09$, $p<.0001$, *Pro-social skills*, $t(71)=-2.94$, $p<.004$, *Impact on Life* $t(71)=6.41$, $p<.0001$.

Table 6-3: Class teachers' ratings in the SDQ for the EB and Control groups

SDQ scores	Overall Stress	Emotion	Behaviour	Hyper/attention	Peers	Pro-social	Impact on life
EB group (n=31) (4 missing)							
Mean	20.77	3.71	4.68	8.03	4.35	3.93	2.93
Median	21	4	5	9	5	4	3
S.D.	5.30	2.04	2.52	2.15	2.27	2.16	1.20
Minimum	11	0	0	1	1	0	1
Maximum	32	7	10	10	9	10	6
Control group (n=40) (2 missing)							
Mean	5.70	1.35	0.72	2.15	1.4	8.42	0.1
Median	4.5	0.5	1.2	2.27	0	9	0
S.D.	4.70	1.94	1.22	1	1.85	2.22	0.5
Minimum	0	0	0	0	0	1	0
Maximum	21	9	5	8	6	10	3

Scores in the teacher completed forms were also significantly lower in the EB group than the control group (*Overall stress*, $t(66)=9.34$, $p<.0001$; *Emotional distress*, $t(66)=4.34$, $p<.0001$; *Behavioural difficulties*, $t(66)=5.43$, $p<.0001$; *Hyperactivity/ inattention*, $t(66)=8.59$, $p<.0001$, *Difficulty getting on with peers*, $t(66)=4.89$, $p<.0001$, *Pro-social skills*, $t(66)=-2.94$, $p<.0001$, *Impact on Life* $t(66)=10.32$, $p<.0001$).

When compared with the scores in the standardisation of the SDQ (see Chapter 5, 5.1.5) mean scores for the control group are comparable. As would be expected, scores in the EB group are considerably higher.

Proportions at low, medium and high risk of diagnosis

Tables 6-4 and 6-5 illustrate the number and percentage of boys in the EB and Control group whose SDQ scores indicate that they were at high, medium or low risk of a diagnosis of any disorder, an emotional disorder, a behavioural disorder or a hyperactivity disorder. For four boys in the EB group teacher information is missing, however it is still possible to calculate their risk of diagnosis from the parent

information only. As the EB group was determined by whether a participant was at high risk of an externalising diagnosis (behavioural disorder and/ or hyperactivity disorder) it follows that all the boys in this group are at high risk of a diagnosis. Similarly there are no boys in the Control group who are at high risk as these boys were excluded from the final analysis. It is of note that diagnoses are not mutually exclusive and many boys have a degree of emotional difficulties.

Table 6-4: Risk of diagnosis from SDQ information: EB group (n=35, Note: 4 parent SDQ only)

SDQ – risk of diagnosis	Any disorder	Emotional Disorder	Behavioural Disorder	Hyperactivity disorder
Low risk	0 (0)	14 (40.0)	6 (17.1)	6 (17.1)
Medium risk	0 (0)	16 (45.7)	2 (5.7)	10 (28.6)
High risk	35 (100)	5 (14.3)	27 (77.1)	19 (54.3)

Table 6-5: Risk of diagnosis from SDQ information: Control group (n=40, 2 missing)

SDQ – risk of diagnosis	Any disorder	Emotional Disorder	Behavioural Disorder	Hyperactivity disorder
Low risk	35 (83.3)	39 (92.9)	36 (85.7)	40 (95.2)
Medium risk	7 (16.7)	3 (7.1)	6 (14.3)	2 (4.8)
High risk	0 (0)	0 (0)	0 (0)	0 (0)

6.2.1.2 Language skills: CELF-4

Sub-test scores

As explained in the Methodology (5.1.1.3) the CELF-4 is composed of sub-tests scores that are combined to give three composite scores. These subtests are *Concepts and Following Directions (C&FD)*, *Recalling Sentences (RS)*, *Formulated Sentences (FS)*, *Word Classes – Receptive (WC-R)*, *Word Classes – Expressive (WC-E)*, and for children under age 9, *Word Structure (WS)* and *Sentence Structure (SS)*. The two *Word Classes* subtests are combined to give a *Word Classes – Total (WC-T)* score.

Table 6-6 displays the EB group and Control group CELF-4 sub-test scores. For each sub-test a standard scores of between 7 and 13 is within the average range. Unsurprisingly, considering the large overlap with the LD group (as illustrated in Figure 6-2), the EB group scored significantly lower than the Control group for all subtests (*Concepts & Following Directions*, $t(75)=-6.56$, $p<.0001$; *Recalling*

Sentences, $t(75)=-4.56$, $p<.0001$; *Formulating Sentences*, $t(75)=-7.78$, $p<.0001$; *Word Classes-Receptive*, $t(75)=-4.26$, $p<.0001$; *Word Classes-Expressive*, $t(75)=-6.92$, $p<.0001$; *Word Classes-Total*, $t(75)=-5.79$, $p<.0001$).

Table 6-6: EB and Control group CELF-4 sub-test scores

CELF-4 sub-scale							children under 9	
	C&FD	RS	FS	WC-R	WC-E	WC-T	WS	SS
EB (n=35)							n=10	
Mean	6.68	7.49	6.22	7.06	5.56	6.09	7.80	11.00
Median	7	7	6	7	5	6.5	8	11
SD	3.69	3.17	3.04	3.04	2.51	2.49	2.86	1.94
Minimum	1	2	1	1	1	2	2	7
Maximum	13	14	13	13	10	11	12	13
Control (n=42)							n=10	
Mean	11.12	10.57	11.09	9.76	9.54	9.63	11.1	10.67
Median	11	10.5	11	9	9	9	11.5	12
SD	2.15	2.77	2.45	2.83	2.45	2.75	1.91	2.74
Minimum	6	4	6	6	5	5	8	5
Maximum	14	17	15	19	17	18	13	13

CELF-4 Composite Scores

Table 6-7 displays the standard scores for the three composite measures of language: the *Core Language Scale (CLS)*, the *Receptive Language Index (RLI)* and the *Expressive Language Index (ELI)*.

Table 6-7: EB and Control group CELF-4 composite scores

CELF-4 Overall Scores	CLS Standard Score	RLI Standard Score	ELI Standard Score
EB Group (n=35)			
Mean	79.4	83.43	78.83
Median	78	88	77
SD	16.40	15.78	14.96
Minimum	44	49	49
Maximum	114	105	112
Control Group (n=42)			
Mean	103.93	102.63	103.14
Median	103	101	101
SD	11.94	12.79	12.05
Minimum	82	83	83
Maximum	130	134	132

As would be expected given the scores above, the EB group scored significantly lower in these composite scores (CLS, $t(75)=-7.58$, $p<.000$; ELI $t(75)=-5.86$, $p<.0001$; RLI, $t(75)=-7.09$, $p<.0001$). As the composite scores are of higher reliability (Semel, Wiig & Secord, 2006) than the sub-scales that combine to form them and there is no rationale to look specifically at any of the sub-scales scores, further analysis will be carried out using these three composite scores.

6.2.1.3 Non-verbal cognitive skills: WASI

The spread of scores for the WASI Overall score in the EB and Control groups are illustrated in Table 6-8 presented as Standard Scores. Though the EB group's scores are well within the average range, the group scored significantly lower than the Control group, $t(75)=-4.42$, $p<.0001$.

Table 6-8: EB and Control group WASI Overall standard scores

WASI	EB group (n=35)	Control group (n=42)
	Standard Score	Standard Score
Mean	92.83	107
Median	93	106.5
SD	12.94	14.85
Minimum	68	76
Maximum	115	142

6.2.1.4 Proportion in the EB group who meet criteria for SLI diagnosis

Investigations were made into the proportions of participants in the EB group who would (1) meet the criteria for SLI discussed proposed by Tomblin (2008), (as discussed in 1.5.3), i.e. have nonverbal cognitive skills within the normal range (standard score greater than 85) and language scores below the 10th percentile, (2) have language difficulties alongside nonverbal cognitive limitations (i.e. have nonverbal cognitive skills below a standard score of 85 and language scores below the 10th percentile, and (3) do not have significant language difficulties. These are displayed in table 6-9.

Table 6-9: Number (%) who meet Tomblin's criteria for SLI in EB group

Participants in EB group	Number (%)
Meets criteria for SLI	16 (45.7)
Significant language and nonverbal cognitive difficulties	7 (20.0)
No significant language difficulties	12 (34.3)

6.2.1.5 Word decoding ability: TOWRE

Table 6-10 displays the Total Word Score in the TOWRE as a standard score for the EB and Control groups. It can be seen that the EB group scores well within the average range and both groups have a very broad spread of scores. However as a group the EB group scores significantly lower than the Control group, ($t(75)=-4.25$, $p<.0001$).

Table 6-10: EB and Control group Total Word Scores in the TOWRE

TOWRE Total Word Score	EB Group (Standard Score)	Control group (Standard Score)
Mean	88	106
Median	92	103.5
SD	19.89	17.29
Minimum	53	69
maximum	135	146

6.2.1.6 Pragmatic language and functional communication skills: CCC-2

As discussed in the Methodology (5.1.2.6) the CCC-2 is composed of 10 subscales and these will be reported in three sections: speech and structural language; pragmatic language and social interaction, followed by the composite scores.

A note on inconsistent CCC-2 forms

A number of forms were found to be “inconsistent” following the scoring system developed for the CCC-2. This was particularly the case for the EB group where 8 out of the 31 participants with completed forms had inconsistent forms. In the Control group only one of the 42 participants’ forms were found to be inconsistent.

Speech and Structural Language Subscales

Table 6-11 displays the EB and the Control group scores for the four subscales investigating speech and structural language, presented as a standard score (SS) and percentile rank (%ile). As for the CELF-4, the standard score average range is from 7 to 13.

Due to non-normally distributed data in this assessment, non-parametric analysis was carried out to compare groups. The EB group scored significantly lower than the control group for all sub-scales (*Speech*, $U=208.0$, $z=-4.89$, $p<.0001$; *Syntax*,

U=216.0, $z=-4.88$, $p<.0001$; *Semantics*, U=125.5, $z=-5.77$, $p<.0001$; *Coherence*, U=74.5, $z=-6.40$, $p<.0001$).

Table 6-11: EB and Control group CCC-2 speech and structural language subscale scores

EB group n=31 (includes eight inconsistent), missing=4				
	Speech SS (%ile)	Syntax SS (%ile)	Semantics SS (%ile)	Coherence SS (%ile)
Mean	5.64 (22.9)	5.55 (21.55)	4.48 (8.58)	4.45 (10.87)
Median	5 (10)	4 (6)	4 (4)	4 (4)
SD	3.84 (28.32)	3.55 (29.79)	2.36 (16.66)	2.57 (18.84)
Minimum	0 (0.5)	1 (1)	0 (0.5)	2 (1)
Maximum	12 (81.0)	12 (80)	14 (95)	13 (90)
Control Group n=40 (includes one inconsistent), missing=2				
	Speech SS (%ile)	Syntax SS (%ile)	Semantics SS (%ile)	Coherence SS (%ile)
Mean	10.5 (61.45)	10.12 (58.42)	10.15 (57.17)	10.87 (65.65)
Median	11.5 (71.5)	12 (80)	10 (57)	12 (75)
SD	2.14 (24.24)	2.47 (28.81)	3.56 (35.17)	2.58 (28.50)
Minimum	4 (6)	4 (6)	3 (2)	4 (4)
Maximum	12 (81)	12 (80)	14 (95)	13 (90)

Pragmatic Language Subscales

Table 6-12 displays the EB and Control group scores for the CCC-2 subscales investigating pragmatic language skills. Again the EB group scored much lower than the Control group for all subscales and for all this was highly significant (*Inappropriate Initiation*, U=77.5, $z=-6.33$, $p<.0001$; *Stereotyped Language*, U=121.5, $z=-5.84$, $p<.0001$; *Use of Context*, U=48.0, $z=-6.66$, $p<.0001$; *Nonverbal communication*, U=74.5, $z=-6.58$, $p<.0001$).

Table 6-12: EB and Control group CCC-2 Pragmatic language subscale scores

EB group n= 31 (includes eight inconsistent), missing=4				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	5.13 (9.63)	5.13 (12.76)	3.32 (5.64)	3.23 (6.35)
Median	5 (5)	5 (5)	3 (1)	3 (1)
SD	1.93 (15.78)	2.47 (19.80)	2.37 (12.85)	2.49 (16.42)
Minimum	2 (0.5)	1 (0.5)	0 (0.5)	0 (0.5)
Maximum	12 (77)	13 (88)	11 (67)	13 (91)
Control Group n=40 (includes one inconsistent), missing=2				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	11.65 (71.12)	10.32 (59.75)	10.72 (58.30)	9.62 (51.30)
Median	12 (77)	10 (55)	10 (56)	10 (54)
SD	2.58 (26.73)	2.82 (28.30)	2.93 (28.96)	2.66 (27.24)
Minimum	3 (1)	3 (2)	3 (1)	4 (5)
Maximum	15 (97)	13 (88)	13 (94)	13 (91)

Social Relationships and Interests

Table 6-13 illustrates the EB group and the Control group range of scores for the two remaining subscales, *Social Relationships* and *Interests*. Again the EB group scored well below the average range and scores are significantly lower than the Control group for both of these subscales (*Social Relationships*, $U= 52.5$, $z=-6.65$, $p< .0001$, *Interests*, $U=78.0$, $z=-6.33$, $p<.0001$). The mean and median EB group scores in the *Social Relationships* sub-scale are particularly low.

Table 6-13: EB and Control groups CCC-2 Social Relationships and Interests subscale scores

EB group n= 31 (includes eight inconsistent), missing=4		
	Social Relationships SS (%ile)	Interests SS (%ile)
Mean	1.87 (3.63)	5.71 (16.29)
Median	2 (1)	6.0 (10)
SD	2.28 (13.13)	2.38 (18.8)
Minimum	0 (0.5)	0 (0.5)
Maximum	12 (74)	10 (63)
Control Group n=40 (includes one inconsistent), missing=2		
	Social Relationships SS (%ile)	Interests SS (%ile)
Mean	8.72 (42.47)	11.92 (73.67)
Median	9 (38)	12 (79)
SD	3.18 (29.05)	3.01 (26.53)
Minimum	2 (1)	4 (1)
Maximum	13 (95)	15 (97)

Composite Scores

Table 6-14 illustrates the CCC-2 composite scores for both the EB and the Control groups. These are the General Communication Composite (GCC), the Social Interaction Deviance Composite (SIDC) and the Pragmatic Language Composite Score (PLCS), as described in the Methodology (5.1.2.6 and 5.1.2.7). The EB group scored significantly lower than the Control group for all of these composite scores: PLCS ($U=46.0$, $z=-6.66$, $p<.0001$), GCC ($U=50.0$, $z=-6.61$, $p<.0001$; SIDC ($U=421.0$, $z=-2.31$, $p=.021$). Bishop (2003) states that a GCC score of below 55 and a SIDC below 0 is indicative of ASD, or at least “pragmatic language difficulties disproportionate to their structural language difficulties” (Bishop, 2003, p21). The EB group mean and median SIDC scores in are in the negative range and mean and median scores in the GCC are well below 55 indicating that many in this group meet these criteria.

Table 6-14: EB and Control group CCC-2 composite scores

EB group n= 31 (includes eight inconsistent), missing=4			
	PLCS	GCC	SIDC
Mean	16.69	36.97 (6.10)	-4.10
Median	16	34 (1)	-3.0
SD	7.86	16.62 (15.70)	7.13
Minimum	2.5	12 (0.5)	-19.0
Maximum	49.0	100 (86)	10
Control Group n=40 (includes one inconsistent), missing=2			
	PLCS	GCC	SIDC
Mean	41.95	83.55 (56.5)	0.25
Median	43	88 (63)	1.5
SD	9.49	16.84 (27.90)	7.23
Minimum	16	42 (4)	-14
Maximum	55	106 (96)	14

Notes re: subgroups and outliers in the CCC-2 PLCS

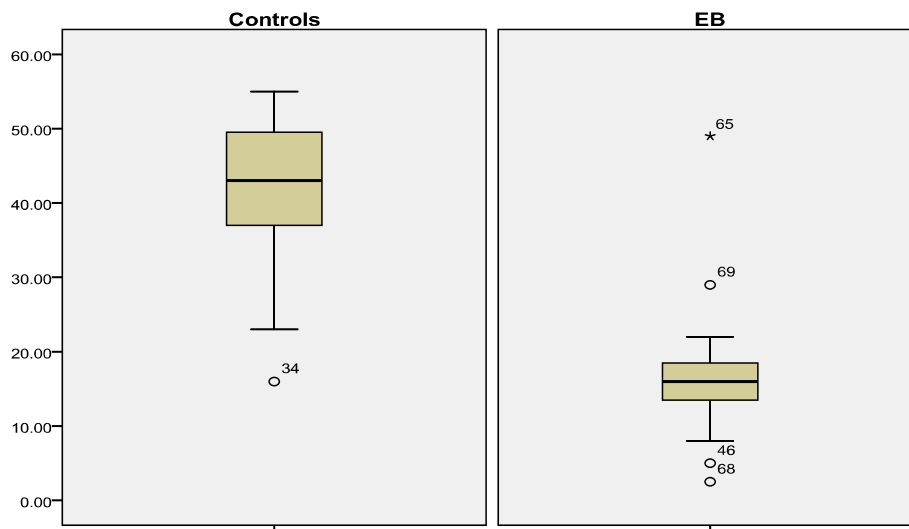
EB group

Though scores in the main are low there is one clear outlier who scores highly in most sub-scales, putting his PLCS well above most others in the EB group (case 65 in Figure 6-3). This is a pupil with ADHD whose SDQ scores indicated that he was at high risk of a hyperactivity disorder but no other disorder. It is also of note that when he was originally assessed his class had a supply teacher and the questionnaires for teachers (CCC-2 and SDQ) were not completed. When followed up by the researcher, his new teacher filled out the forms having only known him for about 2 months. It is possible that he had made very good progress and/ or that she did not know him very well. It is also of note that the two boys with ASD diagnoses are not outliers on the CCC-2.

Control group

There is again one clear outlier (case 34 in Figure 6-3) in the Control group. This is the participant mentioned in the introduction to this chapter (6.1.1.2) who had a diagnosis of ADHD but whose SDQ scores did not put him at high risk of a diagnosis. His GCC is at the 4th percentile and he scored low in many of the subscales.

Figure 6-3 Box Plot of the PLCS for the EB and Control group



6.2.1.7 Consideration of role of language skills in CCC-2 scores

The very low scores across all the subtests of the CCC-2 in the EB group raises questions regarding the extent this is influenced by the high level of language difficulties within the group. Analysis was therefore carried out into sub-groups of the EB group; that is those with EB only (EB-Only) and those with EB and LD (EB&LD). Though numbers become small here, and therefore caution is needed when interpreting these results, Tables 6-15, 6-16 and 6-17 display the scores for the EB& LD (n=23) and EB-Only (n=12) sub-groups.

Table 6-15 shows that, despite the EB-Only sub-group scoring within the normal range in the CELF-4, there is little difference between this sub-group and the EB&LD sub-group in the CCC-2 subscales which investigate teachers' perception of structural language skills. For all subscales except *Speech* the EB-Only sub-group scored slightly lower than the EB&LD sub-group. These differences did not reach significance however (*Speech* $U=99.0$, $z=-0.25$, $p=.799$; *Syntax* $U=81.0$, $z=-1.03$, $p=.303$; *Semantics*, $U=94.0$, $z=-.47$, $p=.636$; *Coherence* $U=102.5$, $z=-.11$, $p=.917$).

Table 6-16 shows that the scores in the two subgroups are also very similar in their pragmatic language subscale scores. There is again no significant difference between groups (*Inappropriate Initiation* $U=85.0$, $z=-.885$, $p=.376$; *Stereotyped Language* $U=63.0$, $z=-1.81$, $p=.070$; *Use of Context* $U=81.0$, $z=-1.05$, $p=.292$; *Non-verbal communication* $U=96.0$, $z=.40$, $p=.690$).

Table 6-15: EB subgroup scores for CCC-2 speech and structural language subscales

EB and LD sub-group n=21 (includes 4 inconsistent), missing = 2				
	Speech SS (%ile)	Syntax SS (%ile)	Semantics SS (%ile)	Coherence SS (%ile)
Mean	5.52 (20.71)	6.05 (25.33)	4.71 (10.12)	4.62 (12.67)
Median	5.0 (10.0)	4.0 (6.0)	4.0 (4.0)	4.0 (4.0)
SD	3.51 (27.17)	3.74 (32.11)	2.59 (19.91)	2.89 (21.91)
Minimum	0 (0.5)	1 (1)	1 (0.5)	2 (1)
Maximum	12 (81)	12 (80)	14.0 (95)	13 (90)
EB only sub-group n=10 (includes 4 inconsistent), missing=2				
	Speech SS (%ile)	Syntax SS (%ile)	Semantics SS (%ile)	Coherence SS (%ile)
Mean	5.9 (27.5)	4.5 (13.6)	4.0 (5.35)	4.1 (7.1)
Median	6.5 (18.0)	4.0 (6.0)	4.0 (4.0)	3.5 (3.0)
SD	4.65 (31.59)	2.99 (23.73)	1.82 (5.15)	1.79 (9.60)
Minimum	0 (0.5)	2 (2)	0 (0.5)	2 (1)
Maximum	12 (81)	12 (80)	7 (19)	8 (32)

Table 6-16: EB subgroup scores for CCC-2 pragmatic language subscales

EB and LD sub-group n= 21 (includes 4 inconsistent), missing=2				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	5.24 (10.64)	4.67 (9.52)	3.14 (5.88)	3.57 (8.2)
Median	5 (5)	4 (3)	3 (1)	3 (1)
SD	2.14 (17.44)	2 .35 (18.76)	2.53 (14.99)	2.80 (19.78)
Minimum	2 (0.5)	1 (0.5)	0 (0.5)	0 (0.5)
Maximum	12 (77)	13 (88)	11 (67)	13 (91)
EB only sub-group n=10 (includes 4 inconsistent), missing=2				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	4.90 (7.50)	6.1 (19.55)	3.70 (5.15)	2.51 (2.5)
Median	4 (1)	5.5 (10.0)	4 (3)	2.5 (1)
SD	1.45 (12.10)	2.56 (21.17)	2.06 (7.16)	1.56 (2.16)
Minimum	4 (1)	2 (0.5)	0 (0.5)	0 (0.5)
Maximum	8 (36)	10 (55)	7 (23)	4 (0.5)

Table 6-17 displays the subgroup scores for the two subscales investigating social interaction skills. The EB-Only sub-group scored lower than the LD&EB sub-group but the differences were not significant (*Social Relationships*, $U=68.5$, $z=-1.64$, $p=.102$; *Interests*, $U=66.0$, $z=-1.67$, $p=.095$).

Given the similarity in the subscale scores reported above, it is not surprising that there was also no significant difference between these two sub-groups in the composite scores as displayed in Table 6-18 (*Pragmatic Language Composite*

Scale, $U=89.0$, $z=-.678$, $p=.498$; General Communication Composite, $U=103.0$, $z=-.086$, $p=.931$; Social Interaction Deviance Composite, $U=91.1$, $z=-.593$, $p=.553$).

Table 6-17: EB subgroup scores for CCC-2 Social Relationships and Interests subscales

EB and LD subgroup n=21 (includes 4 inconsistent), missing=2		
	Social Relationships SS (%ile)	Interests SS (%ile)
Mean	2.29 (4.97)	6.24 (20.59)
Median	2 (1)	7 (20)
SD	2.57 (15.89)	2.34 (21.07)
Minimum	0 (0.5)	2 (0.5)
Maximum	12 (74)	10 (63)
EB only subgroup n=10 (includes 4 inconsistent), missing=2		
	Social Relationships SS (%ile)	Interests SS (%ile)
Mean	1 (0.8)	4.6 (7.25)
Median	0.5 (0.5)	5 (5)
SD	1.15 (0.48)	2.17 (7.65)
Minimum	0 (0.5)	0 (0.5)
Maximum	3 (2.0)	7 (2.0)

Table 6-18: EB subgroup scores for the CCC-2 Composite scores

EB and LD subgroup n= 21 (includes 4 inconsistent), missing=2			
	PLCS	GCC	SIDC
Mean	16.61	37.52 (6.74)	-3.57
Median	16	32 (1)	-3.0
SD	8.39	14.49 (18.4)	7.14
Minimum	5	8 (0.5)	-17
Maximum	49	100 (86)	10
EB only subgroup (includes 4 inconsistent), missing=2			
	PLCS	GCC	SIDC
Mean	16.85	35.8 (4.75)	-5.2
Median	16.5	35 (1.5)	-5.5
SD	7.02	15.45 (8.10)	7.36
Minimum	2.5	12 (0.5)	-19
Maximum	29	68 (27)	7

In summary, despite the EB-Only sub-group scoring at an age appropriate level in the CELF-4, teacher ratings of functional communication skills indicates similar levels of difficulty as the EB&LD sub-group. This includes aspects of speech and structural language as well as pragmatic language skills and social interaction.

6.2.2 Diagnoses and input from SLT

Parents were asked whether their child has received a diagnosis of any of the following: speech/ language difficulties, dyslexia, ADHD, ASD, emotional issues or other. The responses are illustrated in Table 6-19.

Table 6-19: Parent report of their child's diagnoses in EB and Control groups

Child diagnoses	EB group n=35 n(%)	Control Group n=41 (1 missing) n(%)
Speech/language	19 (54.3)	4 (9.5)
dyslexia	5 (14.3)	1 (2.4)
ADHD	11 (31.4)	1 (2.4)
ASD	2 (5.7)	0 (0)
Emotional issues	1 (2.9)	0 (0)
Other	4 (11.4)	2 (4.8)

Note that the category “*Other diagnosis*” sometimes prompted parents to report a medical diagnosis. Similarly the category “*speech/ language difficulty*” was open to interpretation. Discussion with parents during data collection revealed that by this some parents meant a speech sound difficulty when the child was younger for which child received a block or two of therapy (this was especially true for the control group) whereas some did report this as a diagnosis.

Parents were also asked to indicate input from SLT. Table 6-20 shows that considerably more than half of the boys in the EB group have been known to the SLT service though a relatively small number (approximately one quarter) are still receiving input.

Table 6-20: Parent report of input from SLT in the EB and Control group

Input from services	EB n=35	Control n=41 (1 missing)
Ever referred to SLT	21 (60.0)	7 (16.7)
Currently receiving SLT	9 (25.7)	0 (0)

6.2.3 Descriptive information: Environmental measures

Descriptive information will now be presented on the environmental measures gathered in this study: maternal education, adults at home and parenting stress.

6.2.3.1 Maternal Education

Table 6-21 displays the numbers (percentage) of mothers of the participants in each group who left school at 16 years of age with no qualifications versus mothers who received some level of qualification. Within this group are mothers who have gone to university as well as mothers who have done a shorter vocational qualification. It can be seen that boys in the EB group were significantly more likely to have a mother who left school at 16 with no qualifications ($X^2(1)=4.06$, $p=.044$).

Table 6-21: Maternal education of boys in the EB and Control groups

Maternal education	EB group (n= 33, 2 missing)	Control group (n=41, 1 missing)
Leave school 16, no qualifications	23 (69.7)	19 (46.3)
Qualifications of some sort	10 (30.3)	22 (53.7)

6.2.3.2 Adults at home

Table 6-22 displays information regarding the adults living at home with each participant across the EB and Control groups. This data can be converted into a dichotomous variable, comparing those living with both parents and those who do not as illustrated in Table 6-23. Boys in the control group were significantly more likely to live with both parents than boys in the EB group ($\chi^2(1) = 7.15$, $p = .007$).

Table 6-22: Adults at home for the EB and Control groups

Adults at home	EB group (n=35)	Control group (n=42)
Both parents	16 (45.7)	31 (73.8)
Single mum	10 (28.6)	8 (19.0)
Single dad	1 (2.9)	1 (2.4)
Mum and new partner	5 (14.3)	1 (2.4)
Dad and new partner	1 (2.9)	0 (0)
Even split across 2 households	2 (5.7)	0 (0)

Table 6-23: Adults at home as a dichotomous measure for the EB and Control groups

Adults at home	EB group (n=35)	Control group (n=42)
Not both parents	19 (54.3)	10 (24.4)
Both parents	16 (45.7)	31 (73.8)

6.2.2.3 Parenting Stress: PSI

Table 6-24 displays the percentile scores in the sub-domains within the PSI, Parent Domain for the EB and Control groups as well as Mann Whitney analysis comparing the two groups. Non-parametric analysis was carried out as the spread of scores was not normally distributed. The table shows that though the mean and median scores are well within the average range for both groups, the EB group parents are scoring significantly higher (indicating greater stress levels) in the following domains: *Competence*, *Isolation* and *Attachment*. As a result the *Total Parent Domain Score* for the EB group is also significantly higher than for the Control group.

Table 6-24: PSI Parent Domain percentile scores for the EB and Control groups

	EB group N=31, 4 missing	Control group N=38, 4 missing	U	z	Sig. level (p)
Competence					
Mean	49.19	27.41	328.0	-3.31	.001**
Median	45	20			
SD	27.96	22.47			
Minimum	5	1			
Maximum	99	99.5			
Isolation					
Mean	51.76	35.10	426.0	-1.97	.048
Median	60	25			
SD	33.35	25.52			
Minimum	1	1			
Maximum	99	90			
Attachment					
Mean	54.4	33.39	348.0	-2.92	.003**
Median	50	25			
SD	30.80	25.52			
Minimum	1	1			
Maximum	99.5	90			
Health					
Mean	57.85	46.88	470.5	-1.44	.151
Median	65	50			
SD	28.63	30.97			
Minimum	1	2.5			
Maximum	92.5	95			
Role restriction					
Mean	47.77	35.02	449.0	-1.70	.090
Median	55	25			
SD	30.53	26.90			
Minimum	1	1			
Maximum	95	95			
Depression					
Mean	51.97	36.91	435.0	-1.86	.063
Median	50	35			
SD	31.1	25.33			
Minimum	1	1			
Maximum	96	98			
Spouse					
Mean	55.3	49.99	506.0	-0.79	.428
Median	55	55			
SD	28.41	26.04			
Minimum	1	1			
Maximum	97.5	97.5			

Parent Domain: Total					
Mean	50.97	32.25	374.5	-2.59	.010
Median	50	25			
SD	29.22	24.66			
Minimum	1	1			
Maximum	98	92.5			

Table 6-25 illustrates the numbers and proportions in the high stress category (i.e. at or above the 85% percentile). Though there is a trend towards more parents in the high stress category amongst boys in the EB group, this does not quite reach significance ($\chi^2(1)=3.824$, $p=.051$).

Table 6-25: Proportion of parents in “high stress” category (above 85%ile for Parent Domain: Total)in EB and Control groups

PSI – Parent Domain stress	EB group (n=31)	Control group (n=38)
High stress (at /above 85%ile)	9 (29.03)	4 (10.53)
Not high stress (below 85%ile)	22 (70.97)	34 (89.47)

Life stress

Table 6-26 illustrates differences in Life Stress scores for the EB and Control group and Mann Whitney scores. Again a higher score indicates higher levels of stress. Comparison of the groups (Mann Whitney test) indicates that there is no significant difference between EB and Control groups on this measure.

Table 6-26: Life stress scores for the EB and Control groups

Life stress score	EB group	Control group	U	z	Sig. level (p)
Mean	46.27	39.70	507.0	-1.00	.317
Median	50.0	35.0			
SD	31.63	34.97			
Minimum	1	1			
Maximum	99.5	98			

Defensive responding

16.1% (n=5) of parents in the EB group and 15.8% (n=6) in the Control group had PSI scores that indicated defensive responding.

6.2.3.4 Summary

The above section provided descriptive information comparing the EB group and control group. Participant groups are well matched for age and SES, but there are significant differences. Participants in the EB group are significantly more likely to have poorer structural and pragmatic language skills, nonverbal cognitive abilities, and word decoding skills. The boys with EB are also significantly more likely to have a mother who left school at 16 years old with no qualifications, to not live with both parents and to have a primary caregiver with a higher level of stress, notably in self-report of competence, attachment and feelings of isolation. Teacher ratings of functional communication skills indicate no difference between boys with EB only and those with EB and co-occurring LD.

6.3 STRENGTH OF ASSOCIATION BETWEEN VARIABLES MEASURED AND EB

This section will consider whether this study supports previous research that has found a very high level of association between pragmatic language skill and EB. It will consider whether this level of association is higher than for other factors that are commonly associated with EB. The section is split into two sections: Firstly, child abilities (structural language, nonverbal cognitive skills and word decoding) and secondly environmental factors (maternal education, adults at home and parenting stress).

6.3.1 Child Abilities

6.3.1.1 Strength of association between pragmatic language skills and EB

Logistic regression analysis was used to predict group membership (EB group or Control group) from Pragmatic Language Composite Score (PLCS) and is displayed in Table 6-27. The model chi square value indicates that the model fits the data, in other words the PLCS variable predicts group membership significantly better than the null model (Constant value). Table 6-27 also shows that the PLCS reliably distinguished between the EB and Control groups. The odds ratio (Exp(B)) of .795 indicates that there is over a 20% decrease in the likelihood of being in the EB group on the basis of a one unit change in PLCS.

Table 6-27: Results from logistic regression for pragmatic language skills (PLCS) and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
PLCS	.000	.719	.795	.880
Constant	.000			

Note: $R^2 = .595$ (Cox & Snell), $.797$ (Nagelkerke)

Model $\chi^2(1) = 63.32$, $p < .000$

Note: EB group coded 1, Control group coded 0

Analysis also indicated that this model predicts whether a participant will be in the EB group correctly 93.5% of the time and in the control group 89.7% of the time. This gives an overall correct prediction rate at 91.4%, which is very good. Note: Diagnostics have been checked and found to be satisfactory.

6.3.1.2 Strength of association between language skills and EB

Logistic regression analysis investigating the prediction rate of the CELF-4 CLS for group membership (EB or Control group) is displayed in Table 6-28. Again, the CELF-4 CLS reliability distinguished between the groups. The significant model chi square value indicates that the model is a better predictor of group membership than the null model and the odds ratio (Exp(B)) of 0.873 indicates that for each unit change in CELF-4 CLS score there is approximately a 13% decrease in the likelihood of being in the EB group.

Analysis also indicates that this model predicts whether a participant will be in the EB group correctly 77.1% of the time and in the control group 83.9% of the time. This gives an overall prediction rate of 80.3%, which again is very good. Note: Diagnostics have been checked and found to be satisfactory

Table 6-28: Results from logistic regression for language skills (CELF-4 CLS) and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
CELF 4 -CLS	.000	.822	.873	.928
Constant	.000			

Note: $R^2 = .438$ (Cox & Snell), $.585$ (Nagelkerke)

Model $\chi^2(1) = 43.77$, $p < .000$

Note: EB coded 1, Control group coded 0

6.3.1.3 Strength of association between nonverbal cognitive ability and EB

Logistic regression analysis was carried out investigating the ability to predict group membership (EB and Control group) from score in assessment of nonverbal cognitive ability (WASI Overall score). In Table 6-29 we can see that WASI score reliably differentiated between the EB and Control groups. The model chi square value indicates that this variable predicted group membership better than the null model and the odds ratio (Exp(B)) value of .965 indicates that for each unit change in the WASI score there is an 3.5% decrease in likelihood of being in the EB group.

Table 6-29: Results from logistic regression for nonverbal cognitive skills (WASI) and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
WASI	.000	.887	.965	.925
Constant	.000			

Note: $R^2 = .216$ (Cox & Snell) , .288 (Nagelkerke)

Model $\chi^2(1)=18.45$, $p<.000$

Note: EB coded 1, Control group coded 0

Analysis also indicated that this model predicts whether a participant will be in the EB group correctly 54.3% of the time and in the control group 70.7% of the time. This gives a total of 62.3% participants predicted correctly. Classification is therefore moderate, but not as strong as the above variables. Note: Diagnostics have been checked and found to be satisfactory.

6.3.1.4 Strength of association between word decoding and EB

Logistic regression analysis was carried out to investigate whether the TOWRE Overall Word score predicted group membership (EB or Control group). Table 6-30 indicates that TOWRE Overall word score was significantly associated with group membership (EB or Control). The significant value for the model chi square indicates that this variable predicts group membership better than the null model. The odds ratio (Exp(B)) value of .946 indicates an approximate 5% decreased likelihood of being in the EB group with each unit change in TOWRE assessment score.

Table 6-30 : Results from logistic regression for word decoding skills (TOWRE) and EB

	B	SEB	Sig level	95% CI		
				Lower	Exp(B)	Upper
TOWRE	.053	.015	.000	.917	.946	.975
Constant	-4.942	1.480	.001			

Note: $R^2 = .206$ (Cox & Snell) , .275 (Nagelkerke)

Model $\chi^2(1)=17.52$, $p<.000$

Note: EB coded 1, Control group coded 0

Analysis also indicates that this model predicts whether a participant will be in the EB group correctly 54.3% of the time and in the control group 73.2% of the time. This gives a total of 64.5% of participants predicted correctly. This model is therefore classifying participants correctly at a level similar to the WASI score, which is moderately good. Note: Diagnostics have been checked and found to be satisfactory.

6.3.1.5 Building a model: Multiple logistic regression analysis

The intention was to carry out multiple logistic regression analysis to investigate the relative strength of association between different variables and EB. However, when the variables were entered into a multivariate logistic regression model together there were numerical problems (standard errors for Beta were extremely large, particularly for the pragmatic language measure (PLCS) and the diagnostic statistics were found to be unsatisfactory). Consideration of the univariate analysis indicated that issues may lie with the PLCS as this measure almost completely predicted whether a participant would be in the EB or the Control group.

This is a recognised reason for problems carrying out such analysis, described by Hosmer & Lemeshow (2000) as follows: “A numerical problem occurs when a collection of the covariables completely separates the outcome groups or, in the terminology of discriminant analysis, the covariates discriminate perfectly” (Hosmer & Lemeshow, 2000, p138). They further state that “When overlap is at a single or a few tied values the configuration was termed by Albert and Anderson as quasicomplete separation”, (Hosmer & Lemeshow, 2000, p139). They confirm the reasons for this to be the issues found in the current study, reporting as follows, “In general, the numerical problems of zero cell count, complete separation and collinearity, are manifested by extraordinarily large estimated standard errors and sometimes by a large estimated coefficient as well.” (Hosmer & Lemeshow, 2000, p141). It seems that the issues found were due to “quasicomplete separation” as described. It can therefore be concluded that pragmatic language is very closely associated with EB, to a level that practically differentiates the groups. This is a closer level of association than between EB and the other three variables.

The remaining three measures of child ability (excluding the PLCS) were then put into a multiple logistic regression model as displayed in Table 6-31. As the table shows the chi square for this model is significant indicating that when the variables are entered together the model reliably distinguishes between the EB and control

groups. The significance levels and odds ratios (Exp(B)) indicate that the CELF-4 CLS variable is the only one that remains significantly associated with EB, with WASI and TOWRE scores dropping out of the model. The CELF-4 CLS odds ratio value of 0.887 indicates that for each unit change in the CELF-4 CLS score, there is an approximate 13% decrease in the likelihood of a participant being in the EB group. This is a very similar level to when the variable was entered into a univariate model and reported in Table 6-31. This is considerably lower than the pragmatic language measure (PLCS).

Table 6-31: Results from multiple logistic regression for child ability variables and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
CELF4 -CLS	.000	.829	.887	.949
WASI	.681	.933	.988	1.047
TOWRE	.434	.359	.948	1.019
Constant	.000			

Note: $R^2 = .44$ (Cox & Snell), $.59$ (Nagelkerke)

Model $\chi^2(3) = 44.80$, $p < .000$

Note: EB group coded 1, Control group coded 0

The analysis also indicated that this model predicts 74.3% of participants in the EB group correctly and 85.4% of the Control group, giving an overall correct prediction rate of 80.3% participants. This is a good level of correct classification, though not as accurate as the PLCS (as reported in Table 6-27, with approximately 91% reported accurately). This again indicates that PLCS is has the strongest level of association with EB of all the aspects of child ability investigated. Note: Diagnostics have been checked and found to be satisfactory.

6.3.2 Environmental factors

In this section the associations between variables investigating aspects of the child's environmental and EB are investigated. Again this will be through univariate logistic regression followed by a multiple logistic regression model for those that are found to be significantly associated.

6.3.2.1 Strength of association between maternal education and EB

Logistic regression analysis was carried out to investigate whether maternal education level (as a dichotomous variable of whether the child's mother left school

at age 16 with no qualifications or not) predicted group membership (EB or Control group). Table 6-32 illustrates the results of this analysis. The value for the model Chi square indicates that this variable predicts group membership significantly better than the null model. The significance level and odds ratio (Exp(B)) indicate that maternal education reliably predicted whether a boy is in the EB or Control group. The odds ratio value of 2.811 indicates that pupils whose mothers were poorly educated were almost three times more likely to be in the EB Group.

Table 6-32: Results from logistic regression for Maternal Education (dichotomous) and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
Maternal Education	.037	1.067	2.811	7.409
Constant	.039			

Note: $R^2 = .060$ (Cox & Snell), $.081$ (Nagelkerke)

Model $\chi^2(1) = 4.551$, $p < .033$

Note: EB group coded 1, Control group coded 0; Mother has no qualifications coded 1; Mother has qualifications coded 0

Analysis also indicated that this model predicted 69.7% of participants in the EB group correctly and 55.0% of the Control group. This gives a reasonably good overall correct prediction rate of 61.6%. Note: Diagnostics were checked and found to be satisfactory.

6.3.2.2 Strength of association between Adults at Home and EB

Logistic regression analysis investigating whether group membership (EB or Control) can be predicted by the adults at home variable (as a dichotomous measure of whether the child lives with both parents or not). The results of the analysis are displayed in Table 6-33. The model chi square is significant, indicating that the model is a better predictor than the null model. The significance level and odds ratio (Exp(B)) indicate that this variable is a reliable predictor of whether the child is in the EB or Control group. The odds ratio value of 3.562 indicates that pupils who do not live with both parents are some three to four times more likely to be in the EB group.

Analysis also indicated that classification is moderately good with the model predicting 54.3% of the EB group correctly and 75.6% of the Control group, giving 65.8% predicted correctly overall. Note: Diagnostics have been checked and have been found to be satisfactory.

Table 6-33: Results from logistic regression for adults at home (dichotomous) and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
Adults at home	.011	1.341	3.562.	9.463
Constant	.042			

Note: $R^2 = .087$ (Cox & Snell) , .116 (Nagelkerke)

Model $\chi^2(1)=6.84$, $p=.007$

Note: EB group coded 1, Control group coded 0; Child does not live with both parents coded 1; child lives with both parents coded 0

6.3.2.3 Strength of association between parenting stress and EB

Logistic regression analysis was carried out to investigate whether the Parent Domain Total Score in the PSI significantly predicted group membership (EB or Control). The results of the analysis are displayed in Table 6-34. The model chi square is again significant indicating that the model is a better predictor of group membership than the null model. The significance level and odds ratio (Exp(B)) indicate that the PSI is a reliable predictor. The odds ratio at .975 indicates that for each unit change in the PSI score there is an approximate 3% increase in the chance that a participant is in the EB group (Note: in this measure a higher score indicates more significant issues, this is the reverse of all other assessments investigated so far).

Table 6-34: Results from logistic regression for PSI parent domain total score and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
PSI Parent Domain Total	.005	1.009	1.029	1.049
Constant	.006			

Note: $R^2 = .126$ (Cox & Snell) , .168 (Nagelkerke)

Model $\chi^2(1)=9.16$, $p=.002$

Note: EB group coded 1, Control group coded 0

Analysis also indicated that successful classification is again moderately good. The model predicts 54.8% of the EB group correctly and 78.4% of the Control group, giving a total of 67.6%. Note: diagnostics have been checked and have been found to be satisfactory.

6.3.2.4 Building a model: multiple logistic regression analysis

In the univariate analysis above, all three of the environmental measures were found to be significantly associated with EB. They were therefore all entered together into

a multiple logistic regression model. Coding for the dichotomous measures was as for the univariate analysis. The results of this analysis are displayed in Table 6-35. The significance levels indicate that when the variables are entered into the model together only the PSI Parent Domain score significantly predicts EB or Control group membership with the other two variables no longer remaining significant. The odds ratio (exp(B)) value of 1.028 indicates that with a unit increase in the PSI parent domain score, the likelihood of being in the EB group increased by approximately 3%.

Table 6-35: Results from multiple logistic regression for environmental factors and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
PSI – Parent domain score	.013	1.006	1.028	1.051
Mat Education	.546	.458	1.415	4.371
Adults at home	.364	.520	1.757	5.938
Constant	.002			

Note: $R^2 = .178$ (Cox & Snell) , .238 (Nagelkerke)

Model $\chi^2(3) = 12.91$, $p = .005$

Note: EB group coded 1, Control group coded 0

The model predicts 69.0% of the EB group correctly and 81.1% of the Control group. This gives a total of 75.8% participants predicted correctly. Note: Diagnostics have been checked and values for Leverage were found to be a bit high indicating that some cases are exerting undue influence over the model; however they are within limits that are considered satisfactory (Stevens, 2002).

6.3.3 Combining the two models

Participant numbers are too small for all seven variables investigated to be entered into a multiple logistic regression model together. However it is possible to enter the two variables together that were found to be most closely associated with EB in the above two multiple regression models, that is the CELF-4 CLS and the PSI Parent Domain. Though there is strong evidence that the pragmatic language variable (PLCS) is more closely associated with EB than either of these variables, again this has to be excluded from the analysis due to the numerical issues causing quasi-complete separation (as discussed in section 6.3.1.5).

Table 6-36 displays the results of a multiple logistic regression analysis for CELF-4 CLS and PSI–Parent domain with EB. The significant levels indicate that when these variables are entered into the model together then both remains significantly

associated with EB. The odds ratio (Exp(B)) for the PSI Parent Domain score at 1.029 indicates that as in the univariate analysis, for each unit increase in score, there is an approximate 3% increase in the odds of being in the EB group. For the CELF-4 for each unit increase in score there is an approximate 13% decrease in chance of being in the EB group. This indicates a closer association with language skills and EB than parenting stress.

Table 6-36: Results from multiple logistic regression analysis for PSI and CELF-4 and EB

	Sig level	95% CI		
		Lower	Exp(B)	Upper
PSI Parent Domain	.035	1.002	1.029	1.056
CELF 4-CLS	.000	.822	.876	.935
Constant	.000			

Note: $R^2 = .469$ (Cox & Snell), $.627$ (Nagelkerke)

Model $\chi^2(3) = 43.06$, $p < .000$

Note: EB group coded 1, Control group coded 0

Analysis also indicated that classification in this model is very good with 80.6% of the EB group predicted correctly and 83.6% of the Control group, giving 82.4% of participants predicted correctly overall. Note: Diagnostics have been checked and have been found to be satisfactory.

6.3.3.1 Summary

The above analysis shows that PLCS is very closely associated with EB. This variable almost completely differentiates the EB and Control groups. Though it was not possible to enter this variable into a multiple logistic regression model due to statistical issues, there is strong evidence that this variable is the most closely associated with EB.

Multiple logistic regression analysis was possible for the other variables. A multiple regression model of the Child Ability variables demonstrated that CELF-4 CLS score was most closely associated with EB. The other measures, though significantly associated with EB when investigated in isolation, dropped out of the combined model. A multiple logistic regression model of the Environmental Factors demonstrated that, again, although all variables investigated were significantly associated with EB, PSI Parent Domain total score was the only variable that remained significantly associated when all three variables were entered into a model together.

Sample size was too small to enter all variables together in a multiple regression model, however it was possible to take the two variables that were found to be significant in the above two models (CELF-4 CLS and PSI-Parent domain) and enter these into a logistic regression model together. Both CELF-4 CLS and PSI Parent Domain score remained significantly associated with EB in the combined model, however the CELF-4 CLS had a higher odds ratio indicating a closer association with EB. This indicates that even when environmental issues and other aspects of the child's ability are considered, there is a particularly close association between communication difficulties and EB.

6.4 CHAPTER SUMMARY

This chapter has provided the analyses for Research Questions Part 1. Descriptive information comparing the EB and Control group was presented. This was followed by logistic regression analysis investigating strengths of association between EB and aspects of the child's ability and environment.

CHAPTER 7: ANALYSIS FOR RESEARCH QUESTIONS PART 2

This chapter starts by providing descriptive information comparing the LD and the Control groups on the following measures: language skills (CELF-4), nonverbal cognitive skills (WASI) and pragmatic language skills (CCC-2 subscales) as these are the variables considered later in the analysis. Following this, comparisons are made between the LD and the Control group for the tests of social cognition: (1) the Happé Strange Stories (2) Second Order Theory of Mind and (3) the Scale of Theory of Mind. Investigations will then be made into the extent the different variables investigated are associated with social cognition test performance. The importance of age will also be investigated. Consideration will then be paid to the extent boys with LD can perform well in tasks of social cognition, despite their limited language skills. In the final section, comparisons are made into the parent and teacher ratings of ability to get on with peers for the LD and Control group. Analysis will be carried out into the extent social cognition scores and other aspects of ability are associated with friendship score.

7.1 DESCRIPTIVE INFORMATION: LD AND CONTROL GROUPS

7.1.1 Age

Table 7-1 displays information about the ages of participants in the LD and Control groups. There is no significant difference between the groups, indicating that they are well matched ($t(71)=1.351$, $p=.181$).

Table 7-1: Age of participants in the LD and Control group

Age	LD group (n=31)	Control group (n=42)
Mean	126.77	122.31
Median	129.0	122.5
SD	13.91	13.99
Minimum	100	97
Maximum	153	146

7.1.2 Language skills: CELF-4

CELF-4 Sub-tests

The CELF-4 sub-tests scores for the LD and Control group are displayed as standard scores in Table 7-2. The subtests are *Concepts and Following Directions*

(C&FD), *Recalling Sentences (RS)*, *Formulated Sentences (FS)*, *Word Classes-Receptive (WC-R)*, *Word Classes-Expressive (WC-E)* and *Word Classes-Total (WC-T)*, and for under 9 year olds *Word Structure (WS)* and *Sentence Structure (SS)*. For each sub-test a standard scores of between 7 and 13 is within the average range.

Table 7-2: LD and Control groups CELF-4 subscale scores

CELF-4 sub-scale							children under 9	
	C&FD	RS	FS	WC-R	WC-E	WC-T	WS	SS
LD (n=31)							n=4	
Mean	5.10	5.39	4.74	6.06	4.84	5.26	5.25	10.5
Median	4	6	5	6	5	5	6	11
SD	3.38	2.71	2.43	2.22	2.28	2.05	2.36	2.52
Minimum	1	1	1	2	1	2	2	7
Maximum	13	10	10	11	10	9	7	13
Control (n=42)							n=10	
Mean	11.12	10.57	11.09	9.76	9.54	9.63	11.1	10.67
Median	11	10.5	11	9	9	9	11.5	12
SD	2.15	2.77	2.45	2.83	2.45	2.75	1.91	2.74
Minimum	6	4	6	6	5	5	8	5
Maximum	14	17	15	19	17	18	13	13

As would be expected the LD group scored significantly lower than the control group for all subtests, (*Concepts and Following Directions*, $t(71)=9.28$, $p<.0001$; *Recalling Sentences*, $t(71)=7.14$, $p<.0001$; *Formulating Sentences*, $t(71)=10.85$, $p<.0001$; *Word Classes-Receptive*, $t(71)=5.00$, $p<.0001$; *Word Classes-Expressive*, $t(71)=8.29$, $p<.0001$; *Word Classes-Total*, $t(71)=7.42$, $p<.0001$). Due to the very small numbers this analysis was not carried out for the two assessments for children under 9, *Word Structure* and *Sentence Structure*.

CELF-4 Composite Scores

Table 7-3 displays standard scores for the three composite measures of language, the Core Language Scale (CLS), Receptive Language Index (RLI) and Expressive Language Index (ELI). Again a Standard Score of between 7 and 13 is within the average range. It can be seen that the mean RLI percentile scores for the LD Group is slightly above the 10th percentile. This is due to the inclusion of participants who scored below the 10th percentile in the ELI only, indicating more specific expressive language difficulties. Likewise there was one participant who scored within the average range for the expressive language subtests but whose scores indicated receptive language difficulties.

Table 7-3: LD and Control group CELF-4 composite scores (standard scores)

CELF-4 Overall Scores	Core Language Scale	Receptive Language Index	Expressive Language Index
LD (n=31)			
Mean	70.39	75.90	69.87
Median	72.0	76	71
SD	12.19	13.54	10.81
Minimum	44	49	47
Maximum	90	99	89
Control (n=42)			
Mean	103.93	102.63	103.14
Median	103	101	101
SD	11.94	12.79	12.05
Minimum	82	83	83
Maximum	130	134	132

The LD group scored significantly lower than the control group for all composite scores (CLS, $t(71)=11.76$, $p<.0001$; $t(70)=8.56$, $p<.0001$; ELI, $t(70)=12.17$, $p<.0001$). Note: there was an error in data collection making it not possible to calculate the RLI for one participant.

7.1.3 Nonverbal cognitive skills: WASI

The spread of scores in the WASI Performance Scales in the LD group and Control group are illustrated in Table 7-4, presented as standard score.

Table 7-4: LD and Control group WASI scores (standard scores)

WASI Performance Scales	LD (n=31)	Control (n=42)
Mean	88.45	107
Median	87	106.5
SD	12.06	14.85
Minimum	68	76
maximum	119	142

The LD group scores significantly lower than the control group, $t(71)=-5.70$, $p<.0001$, however it can be seen that the mean and median scores for the LD group are well within the average range.

7.1.4 Proportion in LD group with SLI profile

Of the 31 in the LD group, 18 (58%) meet the criteria as put forward by Tomblin (2008) for a SLI profile, i.e. have performance IQ scores within the normal range (standard score greater or equal to 85). 13 (42%) have performance IQs below 85.

7.1.5 Pragmatic language skills: CCC-2

As explained in the Methodology (5.1.2.6) the CCC-2 subscales can be grouped as (1) speech and structural language (2) pragmatic language and (3) interaction skills. Standard scores within the average range are between 7 and 13. For this section of the thesis the scores on the pragmatic language subscales are the most relevant so only these will be reported.

Pragmatic Language Subscales

Table 7-5 displays the LD group and Control group scores for the CCC-2 subscales investigating pragmatic language skills, as a percentile and standard score. The LD group scored significantly lower than the Control group for all subscales (*Inappropriate Initiation* $U=72.0$, $z=-6.02$, $p<.0001$; *Stereotyped Language* $U=47.0$, $z=-5.93$, $p<.0001$; *Use of Context* $U=65.5$, $z=-6.09$, $p<.0001$; *Nonverbal communication* $U=84.0$, $z=-5.86$, $p<.0001$).

As would therefore be expected, the Pragmatic Language Composite Score (PLCS) was also found to be significantly lower in the LD group than the Control group ($U=52.0$, $z=-6.24$, $p<.0001$).

Table 7-5: LD and Control group CCC-2 pragmatic language subscale scores

LI group n= 27 (includes five inconsistent), missing=4					
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)	PLCS
Mean	5.44 (11.24)	4.70 (10.02)	3.48 (8.02)	3.78 (9.44)	17.41
Median	5 (5)	4 (3)	3 (1)	3 (1)	16
SD	1.97 (16.04)	2.30 (17.66)	2.81 (18.08)	3.00 (21.32)	8.44
Minimum	2 (0.5)	1 (0.5)	0 (0.5)	0 (0.5)	5
Maximum	12 (77)	13 (88)	11 (67)	13 (91)	49
Control Group n=40 (includes one inconsistent), missing=2					
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)	PLCS
Mean	11.65 (71.12)	10.32 (59.75)	10.72 (58.30)	9.62 (51.30)	41.95
Median	12 (77)	10 (55)	10 (56)	10 (54)	43
SD	2.58 (26.73)	2.82 (28.30)	2.93 (28.96)	2.66 (27.24)	9.49
Minimum	3 (1)	3 (2)	3 (1)	4 (5)	16
Maximum	15 (97)	13 (88)	13 (94)	13 (91)	55

A note on inconsistent forms

As reported in 5.1.2.6, the CCC-2 scoring system identifies checklist response patterns which are deemed inconsistent, indicating that the respondent may not be following the directions correctly. There are 5 inconsistent forms in the LD group.

Four of these were in also the EB group (i.e. these participants had co-existing LD and EB).

7.1.6 Summary

The LD group and Control group were well matched for age (and SES as reported in Chapter 6; 6.1). The group with LD scored significantly lower than the Control group on tests of nonverbal cognitive ability and pragmatic language. However within the LD group there was a wide range of nonverbal cognitive abilities and the mean nonverbal cognitive score was well within the average range. This highlights the heterogeneity of the group.

7.2 PERFORMANCE IN TESTS OF SOCIAL COGNITION

7.2.1 Happé Strange Stories

7.2.1.1 Physical state versus mental state scores

Table 7-6 displays the Happé Strange Stories total mental state and physical state scores in the LD group and the Control group. As the table shows, participants in both groups were far more likely to give mental state answer, than a physical state one. However, the LD group scored significantly lower than the Control group for Mental State score ($t(68)=6.09$, $p<.000$) and significantly higher for Physical State scores ($t(68)=2.05$, $p=.039$), indicating that the boys with LD were significantly more likely to give a physical state answer and significantly less likely to give a correct mental state answer than boys in the Control group.

Table 7-6 – Total mental state versus physical state scores in LD and Control groups

	LD group n=30 (1 missing)		Control group n=40 (2 missing)	
	mental	physical	mental	physical
Mean	9.43	3.43	14.37	2.27
Median	10	3	14.5	2.0
SD	3.44	2.50	3.30	2.10
Min	1	0	6	0
Max	15	8	20	6

7.2.1.2 Mental state answers – breakdown into individual stories

Following the scoring method developed by O'Hare et al (2009) and employed in the current study, the maximum possible mental state score for each Happé Strange Story is 2. Table 7-7 shows the LD and Control group mean Mental State score for each story. The mean score for participants of approximately the same age band as in the current study (i.e. between 8;0 and 11;11 years) in O'Hare et al's (2009) study have also been calculated and are displayed. It is of note that for the majority of the stories, the scores in O'Hare et al's (2009) study are somewhat lower than scores for both the Control and the LD group in the current study.

Table 7-7: Mean mental state scores for individual stories in the LD and Control groups

Mental state answers	O'Hare et al (2009)	LD (n=30)	Control (n=40)	Mann Whitney		
Story	Mean score (8;0-11;11)	Mean score	Mean score	Value of U	Z score	Significance level (p)
Lie (dentist)	1.44	1.48	1.54	529.5	0.191	.871
White Lie (new hat)	1.67	1.21	1.76	342.0	2.731	.002***
Misunderstanding (burglar)	1.24	1.21	1.82	238.5	3.324	.001***
Sarcasm (picnic)	0.86	1.24	1.34	381.0	0.620	.427
Contrary emotions (painting)	1.05	1.14	1.57	369.0	2.592	.01*
Pretend (banana)	1.43	1.50	1.97	316.0	3.030	.006**
Joke (haircut)	0.93	1.27	1.91	124.5	3.013	.007**
Figure of speech (cough)	0.91	1.20	1.82	105.5	3.358	.001***
Appearance/reality (Santa)	1.40	1.53	1.82	289.5	1.924	.122
Forgot (doll)	1.26	1.32	1.46	496.5	0.713	.513
Average	1.22	1.31	1.70			

Due to the non-normal distribution of the data in this measure, non-parametric analysis of the differences between the Control and LD group scores were calculated. These are also displayed in Table 7-7. The LD group scored significantly lower than the Control group for the following stories: *White Lie (New Hat)*,

Misunderstanding (burglar), Contrary emotions (painting), Pretend (banana), Joke (haircut) and Figure of Speech (cough).

7.2.1.3 Inappropriate mental state answers

More in-depth investigations were made into the types of mental state answers that participants gave. Of particular interest are the responses that attribute mental states but are not appropriate to the story (and thus score 0) as these have been found to be more common in children with autism (Happe, 1994). As illustrated in Table 7-8 more boys with LD gave incorrect (0M) answers than boys in the Control group and Chi square analysis showed that this was significant for four stories: *White Lie (new hat), Pretend (banana), Joke (haircut), Forgot (doll)*. It should be noted, however, that the count in some cells was below five and thus the statistical assumptions were not met. Interpretations must therefore be made with caution.

Table 7-8: Inappropriate mental state answers (0M) in the LD and Control groups

Happé story - 0M answers	LD group n (%)	Control group n (%)	Chi square (χ^2)	Sig. level (p)
Lie (dentist)	2 (6.7)	0 (0)	2.74	.098
White lie (new hat)	5 (16.7)	1 (2.5)	4.39	.036*
Misunderstanding (burglar)	5 (16.7)	2 (4.3)	2.59	.107
Sarcasm (picnic)	2 (6.7)	7 (17.5)	1.80	.180
Contrary emotion (painting)	5 (16.7)	4 (10.0)	0.78	.378
Pretend (banana)	5 (16.7)	0 (0)	7.18	.007**
Joke (haircut)	5 (16.7)	1 (2.5)	4.39	.036*
Figure of speech (cough)	2 (6.7)	0 (0)	2.74	.098
Appearance/reality (Santa)	3 (10.0)	1 (2.5)	1.79	.181
Forgot (doll)	3 (10.0)	0 (0)	4.18	.041*

7.2.2 Second order ToM

Table 7-9 displays the LD and Control group performance with the Second Order ToM task. Boys in the LD group were significantly less likely to correctly answer the Second Order ToM question, ($\chi^2(1)=10.61$, $p=.001$) and the linguistic control question, ($\chi^2(1)=9.31$, $p=.002$) than boys in the Control group. The Control group is performing close to ceiling with this task.

Table 7-9: LD and Control group responses in the Second Order ToM task

Questions	Number (percentage) passing	
	LD Group (n=31)	Control group (n=41) 1 missing
ToM question	16 (51.6%)	36 (87.8%)
Linguistic control question	23 (74.2%)	41 (100%)
Comprehension questions	31 (100%)	41 (100%)
Passed both questions	12 (38.7%)	36 (87.8%)
Passed linguistic control & failed ToM question	12 (38.7%)	5 (12.2%)
Failed linguistic control & passed ToM question	4 (12.9%)	0 (0%)
Failed both questions	3 (9.7%)	0 (0%)
Changed answer to the correct one (fridge) when asked "why does Ryan think that?"	8 (25.8%)	4 (9.8%)
Proportion changing answer of total correct answers	50.0%	11.1%

It was recorded whether participants changed their original answers. In particular the LD group often changed their answer to the ToM question ("Where does Ryan think Emma will look for the chocolate?") from the incorrect one to the correct one when asked the follow up question ("Why does Ryan think that?"). The second last row in Table 7-9 presents the numbers in each group who changed their answer from the incorrect one (bag) to the correct one (fridge) at this point. The final row of Table 7-9 shows the proportion of the total who passed the task in each group that changed their answer in this way. It can be seen that half of the boys who answered correctly

in the LD group changed their answer in this way compared with only 11% of the Control group.

7.2.3 Scale of ToM

As explained in the methodology the maximum score possible for the Scale of ToM is 6. The difference in scores in the LD and Control group are displayed in Table 7-10. On average, the participants with LD have significantly lower scores in the Scale of Theory of Mind than boys in the Control group, $U=322.5$, $z=4.40$, $p<.0001$.

Table 7-10: Total scores in the Scale of ToM for the LD and Control groups

Scale of ToM score	LD group n=31	Control group (n=41) one missing
Mean	4.87	5.83
Median	5.0	6.0
S.D	1.06	0.54
Minimum	3	4
Maximum	6	6

Table 7-11 displays the numbers (and percentages) passing each task in the LD and Control groups. As the table illustrates, the majority of participants pass all tasks except for the Hidden Emotion task, with which approximately 50% of the LD group had difficulty. Conversely the Control group performed close to ceiling with this task. As both groups performed close to ceiling with all tasks except Hidden Emotion, this will be the focus of further analysis.

Table 7-11: Scale of Theory of Mind – numbers (percentage) passing each task in the LD and Control groups

Scale of ToM – story	LI (n=31)	Control (n=41), 1 missing
Diverse desire	29 (93.5)	41 (100)
Diverse belief	29 (93.5)	41 (100)
Knowledge access	31 (100)	41 (100)
Theory of Mind	31 (100)	41 (100)
Hidden emotion	16 (51.6)	38 (92.7)
Hidden emotion – justification	13 (41.9%)	37 (90.2)

7.2.4 A note on the participant with ASD

One participant in the LD group was reported by his parents to have received an ASD diagnosis. In the Happé Strange Stories he obtained a mental state score of 14, which is above the average range for the LD group and more similar to a score in the Control group. His Physical State total score was 4, again in keeping with

scores in both in the Control and LD group. He gave one 0M answer for the *White Lie (New Hat)* story. In the Second Order ToM tasks he passed all the comprehension questions, the second order ToM question and linguistic control question. In the Scale of ToM he passed all tasks, including the Hidden Emotion justification giving him the maximum total score possible (6).

7.2.5 Summary

In the Happé Strange Stories the LD group score significantly lower than the Control group in their mental state score. As a group scores were lowest in the following stories: *White Lie, Misunderstanding, Contrary Emotions, Pretend, Joke* and *Figure of Speech*. Boys in the LD group were most likely to give a 0M score (indicating an awareness that the story was to do with mental states but a misunderstanding of what that mental state might be) for the following stories: *White Lie, Pretend, Joke* and *Forgot*.

In the Second Order ToM task the boys in the LD group were significantly more likely to fail the ToM question and the linguistic control question than participants in the Control group indicating that for some the grammatical form of the question may be contributing to their difficulty with this task. All boys passed the comprehension questions indicating that they understood the story. The control group performed at or near ceiling for all three questions. Participants who passed this task in the LD group were more likely to change their answer to the correct one, indicating a need for information processing time.

In the Scale of ToM both groups performed near ceiling for the first four tasks. The final task was problematic for approximately half of the boys with LD, though the boys in the control group again performed near ceiling. In all tasks there was considerable variability in performance amongst the boys with LD. The next section investigates the reasons for this variability.

7.3 ASPECTS OF ABILITY ASSOCIATED WITH SOCIAL COGNITION

In this section investigations are made into what accounts for the variability in the LD group performance in this task. The level of association between aspects of child ability (language, pragmatic language and nonverbal cognitive skills) and

performance on each social cognition test will now be determined through correlation and regression analysis. The importance of age will also be investigated. The analysis for the Happé Strange Stories will consider both the LD and Control group. However, for the other two social cognition tasks the analysis is for the LD group only as the Control group performed close to ceiling with these tasks.

7.3.1 Happé Strange Stories

Correlations

Correlations for the LD and Control groups are displayed in Tables 7-12 and 7-13. These display the correlations between Happé Mental State score and age, the three CELF-4 composite scores, the WASI and the PLCS from the CCC-2. The data for most variables did not deviate significantly from the normal distribution and therefore parametric correlations were calculated (Pearson's *r*). The data deviated severely from the assumptions of normality for the PLCS and therefore Spearman's Rho is calculated for correlations with this variable.

As shown in Table 7-12, for the LD group there are two significant correlations with Happé Mental state score. These are two of the CELF-4 composite scores, the CELF-CLS and the CELF-ELI. As would be expected there is also a high level of multicollinearity between all three of the CELF-4 composite scores, particularly between the CELF-CLS and CELF-ELI. In Table 7-13 it can be seen that there are no significant correlations between any of the variables measured and the Happé mental state score for the Control group. Though not significant, the strongest correlation is with age.

Table 7-12: Correlation Matrix for the Happé Strange Stories (LD group)

	1	2	3	4	5	6	7
1.Happé							
2.Age	.159						
3.CELF-CLS	.403*	-.100					
4.CELF-RLI	.269	-.423*	.764***				
5.CELF-ELI	.404*	.069	.908***	.539**			
6.WASI	.000	.244	.399*	.512**	.268		
7. CCC-2 PLCS¹	.324	.000	.158	.189	.097	-.425	

Significance levels *** .001, ** .01, * .05

¹ Spearman's Rho correlations

Table 7-13: Correlation Matrix for the Happé Strange Stories (Control group)

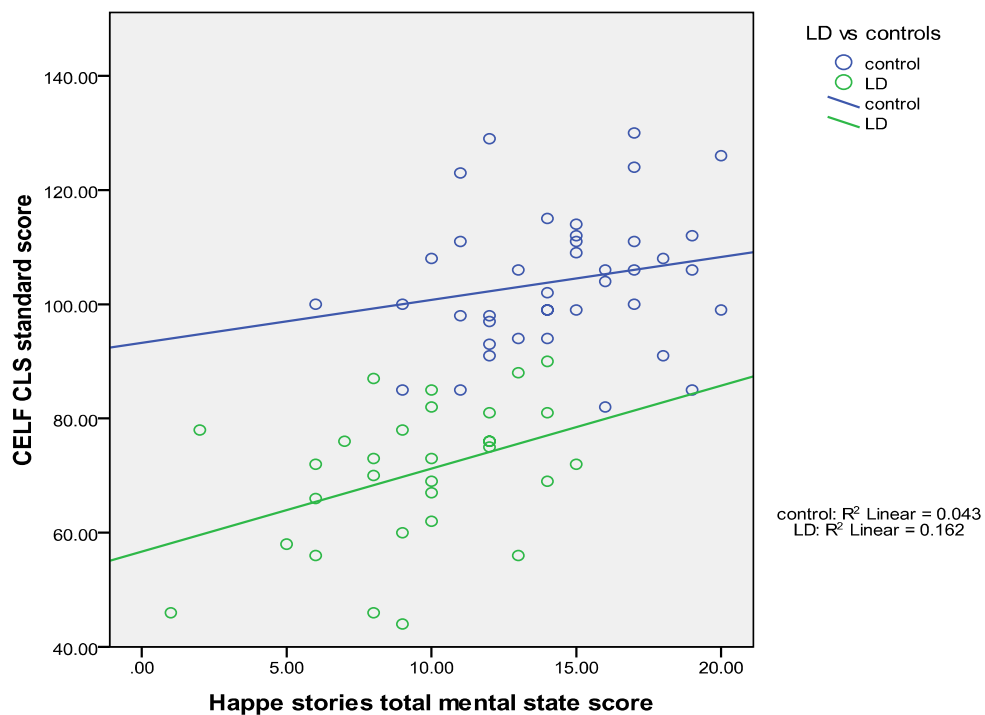
	1	2	3	4	5	6	7
1.Happe							
2.Age	.269						
3.CELF-CLS	.206	.115					
4.CELF-RLI	.159	-.040	.897***				
5.CELF-ELI	.196	.092	.970***	.839***			
6.WASI	.086	.029	.571***	.601***	.584***		
7. CCC-2 PLCS ¹	.204	.109	.336	.134	.353*	.110	

Significance levels ***.001, **.01, *.05

¹Spearman's Rho correlations

Figures 7-1 and 7-2 display the correlations for the LD and Control groups between the Happé mental state score and CELF-4 ELI and CELF-4 CLS scores as scatter plots. This illustrates the spread of scores across both groups and the similar level of moderate correlation between these measures for the LD group.

Figure 7-1: Scatter plot between CELF-4 CLS and Happé mental state score for LD and Control group



7.3.1.1 Regression analysis: LD group

As there were no significant correlations with the Happé mental state score for the Control group, no further analysis with this group was carried out. Regression

analysis for the LD group was carried out for the two variables that were found to correlate significantly: the CELF-4 ELI and CELF-4 CLS. Due to the high level of multicollinearity between these two variables it was not appropriate to enter both variables into a multivariate model together however univariate analysis was carried out for each of these.

The results for the univariate multiple regression analysis for CELF-4 ELI are displayed in Table 7-14. Values for the intercept (B), standard error of the intercept, unstandardised regression coefficient and significance levels show that CELF-4 ELI accounts for a significant level of variance in the Happé mental state scores. The adjusted R^2 value of .133 indicates that approximately 13% of the variability in Happé mental state scores can be explained by CELF-4 ELI score. Note: Diagnostics have been checked and are satisfactory.

Table 7-14: Results from regression analysis for the CELF-4 ELI and Happé mental state score (LD group)

	B	SEB	B	Sig level
Constant	.617	3.821		.873
CELF-ELI	.126	.054	.404	.027

$R^2=.163$, Adj. $R^2=.133$, $F(1,28)=5.45$, $p=.027$

Figure 7-2: Scatter plot between CELF-4 ELI and Happé Mental State score for LD and Control groups

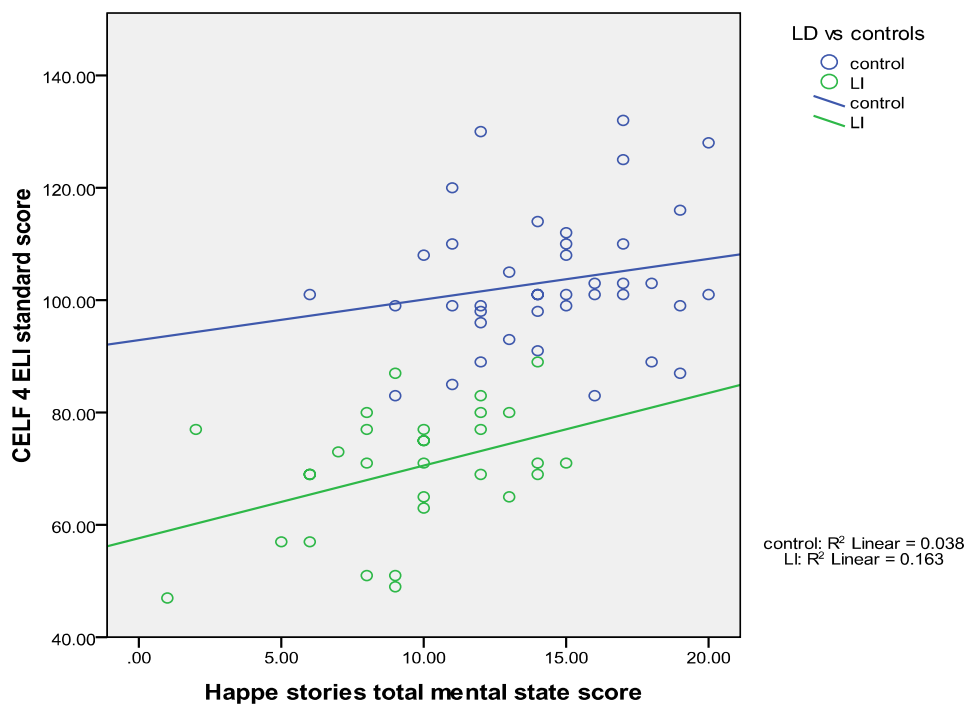


Table 7-15 displays the results of univariate analysis for the CELF-4 CLS and Happé Mental State Score. Values are very similar to the CELF-4 ELI due to the high level of multicollinearity. The adjusted R^2 value of .133 again indicates that approximately 13% of the variability in Happé Mental State score can be explained by the CELF-4 CLS score. Note: Diagnostics have been checked and have been found to be satisfactory.

Table 7-15: Regression analysis for the CELF-4 CLS and Happé mental state score (LD group)

	B	SEB	B	Sig level
Constant	1.562	3.428		
CELF-CLS	.112	.048	.403	.027

$R^2=.162$, Adj. $R^2=.133$, $F(1,28)=5.43$, $p=.027$

7.3.2 Second Order ToM

As the Control group scored close to ceiling in this task, correlation and regression analysis was not carried out for this group and analysis focuses on the LD group only. As the Second Order ToM task has a dichotomous outcome (pass or fail), point biserial correlations were carried out to investigate associations with this variable and are displayed in Table 7-16. It should be noted that it was therefore necessary to use Pearson's r (parametric analysis) although for the PLCS, the data deviates from a normal distribution pattern and some caution is therefore required. As the table shows, there was only one significant correlation with ability to pass the Second Order ToM questions which was the PLCS. No other variable neared significance.

Table 7-16: Correlation Matrix for Second Order ToM (LD Group)

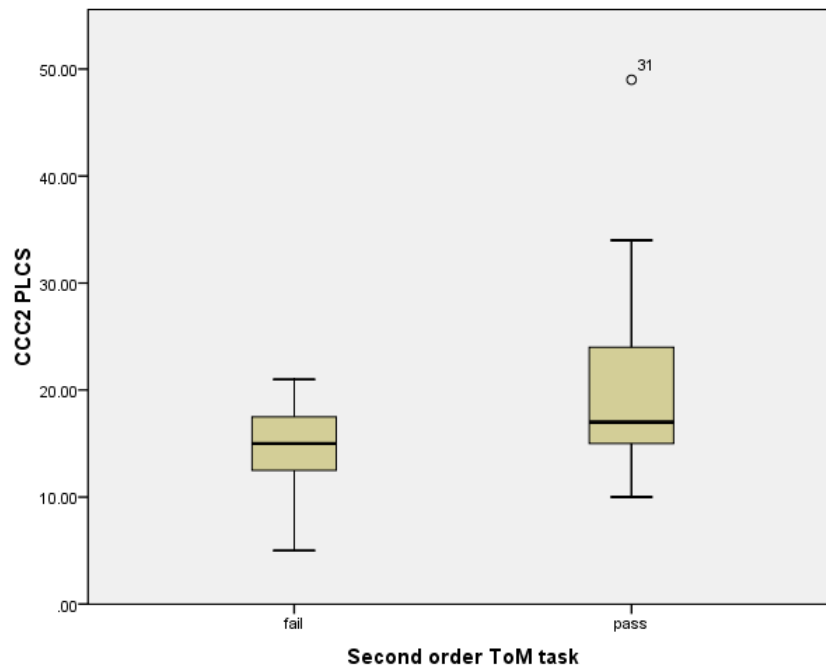
	1	2	3	4	5	6	7
1.2nd Order ToM							
2.Age	.036						
3.CELF-CLS	.290	-.100					
4.CELF-RLI	.255	-.423*	.764***				
5.CELF-ELI	.237	.069	.908***	.539**			
6.WASI	.037	-.244	.399*	.512**	.268		
7. PLCS	.388*	-.224	.090	.205	.069	-.076	

Significance levels *** .001, ** .01, * .05

Figure 7-3 illustrates the spread of scores in the PLCS against the ability to pass or fail this task in both the LD and the Control groups in the form of box plots. It can be seen that there is one outlier (case 31). This boy was identified and discussed in

Chapter 6 (6.2.1.6), as he had an unusually high score in the PLCS for this group. It is of note that he passed this task.

Figure 7-3: Box plots for CCC-2 PLCS of those passing and failing the Second order ToM task (LD group)



7.3.2.1 Logistic regression analysis

Due to the dichotomous nature of the outcome variable (pass or fail in the Second Order ToM task), logistic regression is appropriate and the PLCS was therefore entered into a univariate logistic regression model with second order ToM, to investigate whether PLCS significantly predicted whether a participant in the LD group would pass or fail this task. The results of this analysis are displayed in Table 7-17. Although the model fits the data, significance level and odds ratio (Exp(B)) indicate that the PLCS is not a significant predictor of ability to pass this task. Classification is good when predicting participants that will fail (86.7%) but less so for those that will pass the task (33.3%). This gives an overall correct prediction rate of 63.0%. Note: Diagnostics have been checked and have been found to be satisfactory.

Table 7-17: Results from logistic regression analysis for PLCS and Second order ToM

	Sig level	95% CI		
		Lower	Exp(B)	Upper
PLCS	.103	.969	1.169	1.409
Constant	.076			

Note: $R^2 = .170$ (Cox & Snell) , $.228$ (Nagelkerke)

Model $\chi^2(1)=5.040$, $p=.025$

Note: LD group coded 1, Control group coded 0

7.3.3 Scale of ToM: Hidden Emotion task

As for the Second Order ToM task, the Control group scored very close to ceiling with the Hidden Emotion task, and therefore is not included in this stage of the analysis. The following analysis is for the LD group only. As before univariate logistic regression is carried out with the intention to carry out an exploratory multiple regression model with variables that are found to be significantly associated.

Due to the Hidden Emotion task being a dichotomous pass/ fail measure, point biserial correlations were carried out between the Hidden Emotion task and the other variables investigated. These are displayed in Table 7-18. As before, due to the data not being normally distributed for the PLCS, caution is required in interpretation. As Table 7-18 shows, again there is only one variable that correlates significantly with Hidden Emotion, the PLCS. All other variables show very little relationship.

Table 7-18: Correlation matrix for Hidden Emotion task (LD group)

	1	2	3	4	5	6	7
1.Hidden Em							
2.Age	.095						
3.CELF-CLS	.128	-.088					
4.CELF-RLI	.242	-.449*	.787***				
5.CELF-ELI	.059	.081	.902***	.565***			
6.WASI	-.051	.249	.377*	.443*	.313		
7. PLCS	.501**	-.000	.158	.097	.097	..425*	

Significance levels: *** .001 ** .01, * .05

Figure 7-4 illustrates the spread of scores in the PLCS for those passing and failing this task. Again, case 31 is an outlier due to his high PLCS and as before, it is of note that he passed this task.

7.3.3.1 Regression analysis

As the PLCS was the only variable that correlated significantly with this task, it was entered into a univariate logistic regression model to investigate its ability to predict whether a participant in the LD group will pass or fail the Hidden Emotion task. The results of this analysis are displayed in Table 7-19. The table displays the values for the regression coefficient (B) with standard error, significance level and odds ratio. Though close to significant (at .062), again these values indicate that PLCS is not reliably predicting whether a participant will pass or fail this task.

Figure 7-4: Box plots for CCC-2 PLCS scores of those passing or failing the Hidden Emotion task (LD group)

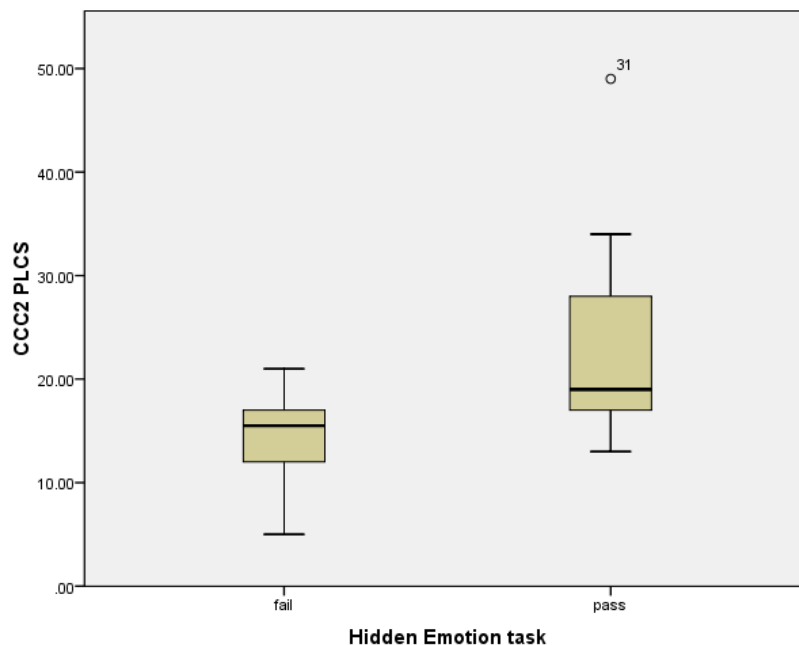


Table 7-19: Results from logistic regression analysis for PLCS and Hidden Emotion task

	Sig level	95% CI		
		Lower	Exp(B)	Upper
PLCS	.062	.986	1.335	1.807
Constant	.032			

Note: $R^2 = .299$ (Cox & Snell), $.416$ (Nagelkerke)

Model $\chi^2(1) = 9.602$, $p = .002$

Note: LD group coded 1; Control group coded 0

Again, classification is good for participants who fail this task but not so good for those who pass. The model predicts 94.4% of those who fail and 44.4% of those that pass correctly giving a total of 77.8% predicted correctly.

7.3.4 Summary

In summary, the different tests of social cognition were found to have generally low levels of correlation with other aspects of ability. Where there were significant correlations these were different for the different tests. For the Happé Strange Stories, the CELF-4 CLS and CELF-4 ELI correlated significantly with Happé mental state score. Regression analysis indicated the CELF-4 ELI explained approximately 13% of the variability in score here, as did the CELF-4 CLS. There were no variables that correlated significantly with Happé mental state score for the Control group.

For the Second Order ToM task analysis was carried out for the LD group only as the Control group performed near ceiling. The measure of pragmatic language skills (PLCS) was the only variable that correlated significantly with ability to pass or fail this task. However, regression analysis indicated that though the model was a good fit for the data the PLCS was not reliably indicating whether a boy with LD would pass or fail this task.

There were similar findings for the Hidden Emotion task. The Control group scored close to ceiling so again analysis was carried out for the LD group only. The PLCS was the only variable that correlated significantly with ability to pass or fail this task. Regression analysis indicated that though the model was a good fit for the data, though close to significant, the PLCS was not reliably indicating whether a boy with LD would pass or fail this task.

7.4 EVIDENCE FOR GOOD PERFORMANCE WITH SOCIAL COGNITION TASKS AMONGST BOYS WITH LD

This section investigates whether there is evidence that boys with LD can “bootstrap” their limited structural language skills and do well with tasks of social cognition.

In sections 7.2 and 7.3, correlation analysis between the language measures and social cognition tasks has already been carried out. This indicated that the CELF-4

CLS correlates significantly with performance in the Happé Strange Stories but not the Second Order ToM or the Hidden Emotion tasks.

Correlations between the CELF-4 CLS and (1) Happé Stories mental state score is at .403, $p=.027$, (2) Second Order ToM is at .290, $p=.114$ and (3) Hidden Emotion task is at .033, $p=.862$. These correlations are illustrated as scatter plots in Figures 7-5, 7-6 and 7-7. (Note Figures 7-6 and 7-7 illustrate point biserial correlations due to the dichotomous nature of the Second Order ToM and Hidden Emotion tasks).

These scatter plots show that there are a number of participants who have very low scores in the CELF-4 CLS who are able to pass these social cognition tasks. Even for the Happé strange stories for which language ability does correlate significantly, Figure 7-5 shows that there are a number of participants with very low language scores who are obtaining relatively high scores in the Happé Strange stories.

Figure 7-5: Scatter plot between CELF-4 CLS and Happé Stories mental state score (LD group)

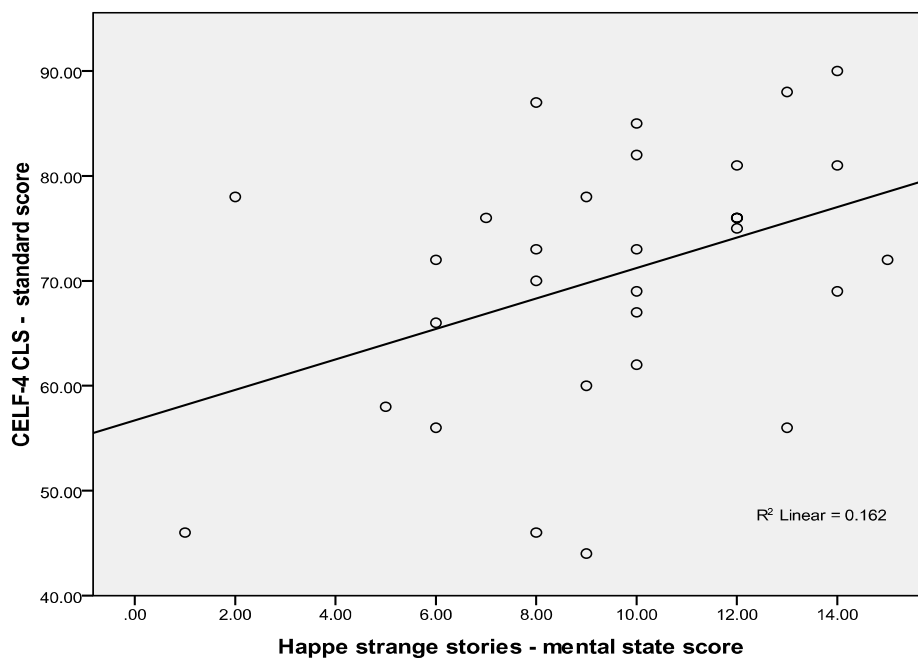


Figure 7-6: Point-biserial scatter plot between CELF-4 CLS and Second Order TOM (LD group)

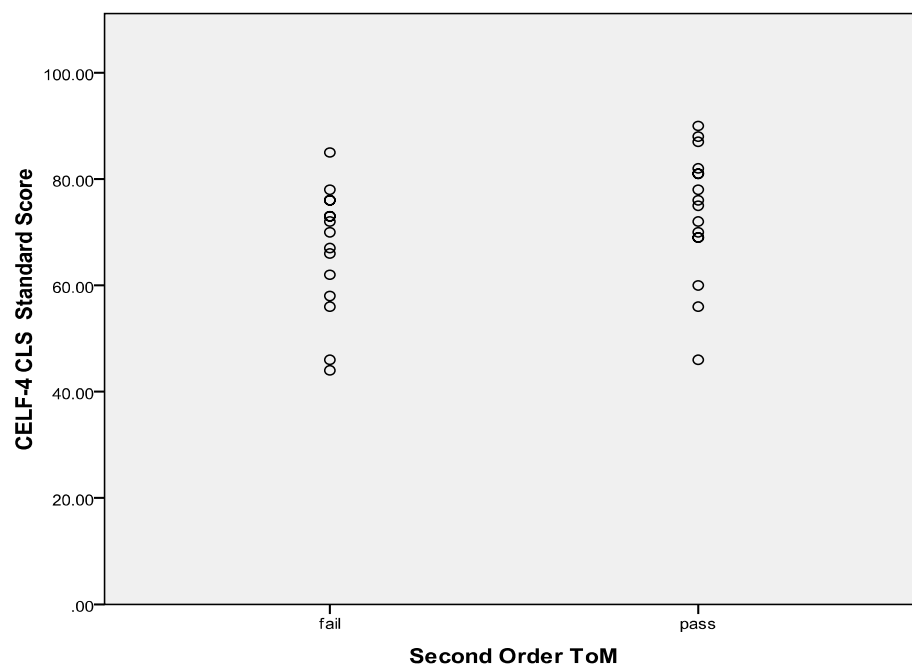
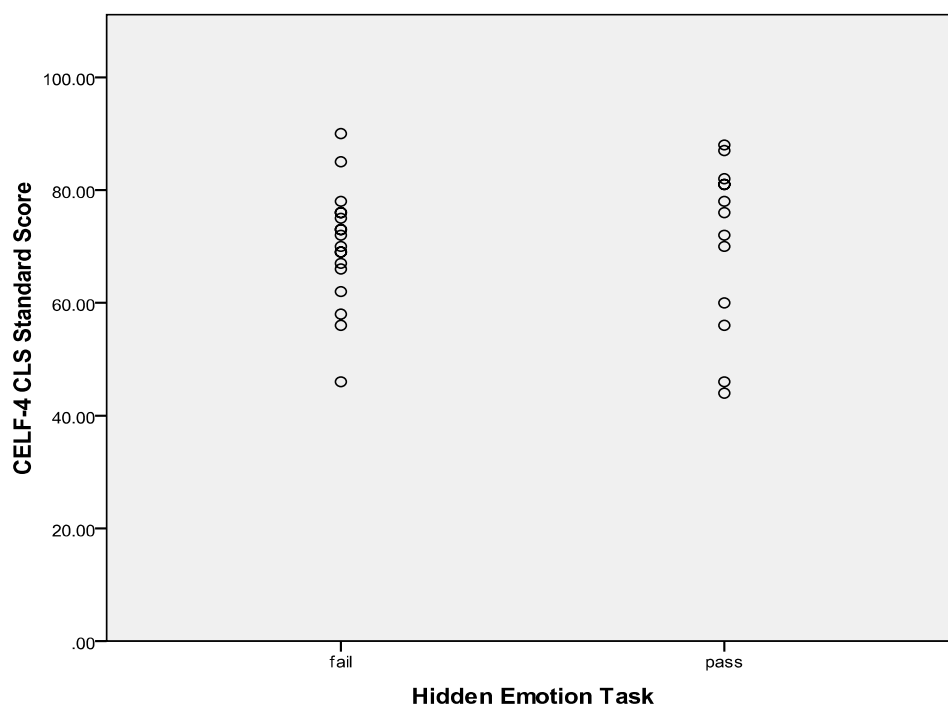


Figure 7-7: Point-biserial scatter plot for CELF-4 CLS and Hidden Emotion task (LD Group)



7.5 FRIENDSHIP OF BOYS WITH LD

The final part of this chapter starts by comparing friendship ratings of boys in the LD and Control groups. Following this regression analysis will be carried out to consider the strength of association between friendship rating and firstly social cognition test scores and secondly, aspects of participants' communication and nonverbal cognitive skills.

7.5.1 Descriptive information

The SDQ provides parent and teacher ratings of the child's ability to get on with his peers. The range of scores given by parents and teachers for participants in the LD and Control groups are displayed in Tables 7-20 and 7-21.

7.5.1.1 Parent ratings

As displayed in Table 7-20, boys in the LD group (as rated by parents) have significantly more difficulties getting on with their peers than boys in the Control group, ($U=201.50$, $z=5.62$, $p<.000$). It can be seen that there are a wide range of scores, particularly for the LD group, in which there is an approximate 50:50 split group in those that score "close to average" or "slightly raised" and those that score "high" or "very high".

Table 7-20: Parent rating of friendship for LD and Control groups

Parent score: difficulties getting on with peers	LD group (n=31)	Control group (n=42)
Mean	3.71	0.90
Median	3.0	0
SD	1.88	1.49
Minimum	1	0
Maximum	9	6
Banding (Parent)	LD group	Control group
Close to average	11 (35.5)	36 (85.7)
Slightly raised	5 (16.1)	3 (7.1)
High	4 (12.9)	1 (2.4)
Very high	11 (35.5)	2 (4.8)

7.5.1.2 Teacher ratings

As displayed in Table 7-21, teachers also rated the boys in the LD group as having significantly more difficulties with friendships than boys in the Control group

($U=269.50$, $z=4.16$, $p<.000$). There are slightly fewer boys in the LD group rated as “high” or “very high” for difficulties getting on with peers amongst teachers than there were for parents.

Table 7-21: Teacher rating of friendship for LD and Control group

Teacher score: difficulties getting on with peers	LD group (n=28, 3 missing)	Control group (n=40, 2 missing)
Mean	3.77	1.40
Median	3	0
SD	2.47	1.85
Minimum	0	0
Maximum	9	6
Banding (Teacher)	LD group	Control group
Close to average	10 (35.7)	30 (75.0)
Slightly raised	6 (21.4)	5 (12.5)
High	3 (10.7)	4 (10.0)
Very high	9 (32.2)	1 (2.5)

7.5.2 Reasons for variability in friendship rating (parent and teacher)

Tables 7-20 and 7-21 show that there is a wide range in ratings of ability to get on with peers within the LD group. This section investigates reasons for this variability through correlation and regression analysis. The following variables will be investigated: social cognition test scores, pragmatic language (CCC-2 PLCS) and expressive and receptive language scores (CELF-4 ELI, RLI and CLS). Two variables are dichotomous (Hidden Emotion and Second Order ToM) and therefore point-biserial correlations are carried out for correlations with these, requiring parametric analysis (Pearson’s r). As both teacher and parent rating of friendship are not normally distributed, nonparametric (Spearman’s Rho) correlations were calculated for all other variables.

7.5.2.1 Parent ratings

As Table 7-22 shows, correlations between parent rating of friendship and the other variables investigated is very low for almost all variables. The only variable that correlates significantly with parent rating of friendship is teacher rating and even this is at a moderate to low level.

Table 7-22 Correlation matrix between parent and teacher rating of friendships and other variables

	1	2
1.Friends (Parent)		
2.Friends(Teacher)	.375*	
3.CELF-4 CLS	-.026	-.225
4.CELF-4 RLI	-.247	-.275
5.CELF-4 ELI	.119	-.062
6. WASI	-.033	-.095
7.CCC-PLCS	-.107	-.147
8. Hidden Emotion ¹	-.079	-.511**
9. 2 nd Order ToM ¹	-.082	-.488**
10.Happé	.070	-.274

Significance level: **.01, *.05

¹ point biserial correlations

7.5.2.2 Teacher ratings

For teacher ratings, as illustrated in Table 7-32 again correlations between friendship rating and the majority of the other variables investigated are low. As for parent ratings, no aspect of communication skills or nonverbal cognitive skills were found to be associated with teacher rating of friendship. There are however two significant correlations with teacher rating of ability to get on with peers: the Hidden Emotion and the Second Order ToM tasks, with both at a moderate level of correlation.

7.5.2.3 Univariate regression analysis

As none of the variables investigated correlated significantly with parent rating of friendship, regression analysis was not carried out for the parent data. However univariate regression analysis was carried out for the teacher rating and the two social cognition tasks which correlated significantly, as follows.

Second Order ToM task

Table 7-23 displays the results of logistic regression analysis investigating the association between teacher rating of ability to get on with peers (raw score) and pass or fail on the second order ToM task. The odds ratio (Exp(B)) of .611 indicates that for each unit increase in teacher rating of difficulties with friendships (indicating more difficulties) there is almost a 40% decrease in the likelihood that a participant will pass this task.

Table 7-23: Results from logistic regression analysis for teacher rating of friendship and 2nd Order ToM (LD group)

	Sig level	95% CI		
		Lower	Exp(B)	Upper
Friends (teacher rating)	.019	.405	.611	.921
Constant	.049			

Note: $R^2 = .231$ (Cox & Snell) , .308 (Nagelkerke)

Model $\chi^2(1)=7.351$, $p=.007$

Classification in this model is very good. The model is predicting 73.3% of those that fail correctly and 76.9% of those who pass with an overall correct prediction rate of 75.0%. Note: Diagnostics have been checked and found to be satisfactory.

Hidden Emotion task

Table 7-24 displays the logistic regression model investigating the association between teacher rating of ability to get on with peers and the Hidden Emotion task. The odds ratio (exp(B)) value of .554 indicates that for each unit increase in teacher rating of friendship (indicating more difficulties) there is an approximate 45% decrease in the likelihood that a participant will pass this task.

Classification is again good. The model predicts 77.8% of those passing and 60.0% of those failing correctly giving a total of 71.4% predicted correctly. Note: Diagnostics have been checked and have been found to be satisfactory.

Table 7-24: Results from logistic regression analysis for teacher rating of friendship and Hidden Emotion task (LD group)

	Sig level	95% CI		
		Lower	Exp(B)	Upper
Friends (teacher rating)	.018	.341	.554	.902
Constant	.100			

Note: $R^2 = .260$ (Cox & Snell) , .357 (Nagelkerke)

Model $\chi^2(1)=9.602$, $p=.002$

7.5.3 Summary

As a group the boys with LD were rated by parents and teachers as having significantly more difficulties with friendship than the typically developing control group. There is however considerable variability in the ratings by both parents and teachers indicating that there is considerable variability in the friendship skills within this group. It is of note that the correlation between parent and teacher ratings is low. No aspect of ability investigated was found to correlate with parent rating. Only

two variables were found to correlate with teacher rating, these were two of the social cognition tasks. Regression analysis also indicated a strong association between ability with these tasks and teacher rating of ability to get on with their peers.

7.6 CHAPTER SUMMARY

This chapter has provided the analyses for Research questions, Part 2. Descriptive information comparing the LD and Control groups has been provided. The LD and Control groups' performance in the social cognition tasks has also been compared and a wide variability was noted in the LD group's ability with these tasks. Investigations were then made into reasons for this variability through regression analysis. In the second part of the chapter the analysis focused on the friendship skills of boys with LD and reasons for variability, again through regression analysis.

CHAPTER 8: ANALYSIS FOR RESEARCH QUESTIONS PART 3

This chapter will present the analysis for Research Questions Part 3. Analysis will involve splitting the Integration Support Audit group into three subgroups: participants with LD only (LD-Only, n=8); participants with LD and EB (LD&EB; n=23) and participants with EB only (EB-Only, n=12). Due to the unexpectedly low scores in all sub-scales of the CCC-2 amongst participants with EB, reported in Chapter 6 (6.2.1.6 and 6.2.1.7), the chapter firstly contains analysis of the pragmatic language skills of these three subgroups. Following this the analysis will focus on the association between EB and social cognition.

8.1 PRAGMATIC LANGUAGE SKILLS

In Chapter 6 (6.2.1.6 and 6.2.1.7) information was presented comparing the LD&EB (n=23) and EB-Only (n=12) sub-group scores in the CCC-2. This analysis demonstrated that across all CCC-2 subscales, those in the EB-Only subgroup did not score significantly differently to those participants in the LD&EB subgroup. In other words, amongst the participants with EB, language ability did not seem to make a difference to teacher completed CCC-2 scores, for speech, structural and pragmatic language skills. Further investigations into pragmatic language skills are carried out in this section through considering pragmatic language ratings in the CCC-2 in the third Integration Support Audit sub-group, those with LD only (LD-Only, n=8).

8.1.1 Pragmatic language subscale scores

The pragmatic language subscale scores of participants in these three sub-groups are presented in Table 8-1, displayed as standard scores and percentiles. The average range for standard scores in this assessment is between 7 and 13. As the table shows the scores in the three groups are similar and Kruskal-Wallis analysis indicates no significant difference between these three subgroups, *Inappropriate initiation*, $H(2)=2.31$, $p=.316$; *Stereotyped Language*, $H(2)=3.20$, $p<.202$; *Use of Context* $H(2)=1.20$, $p=.550$; and *Nonverbal Communication* $H(2)=.53$, $p=.768$.

Table 8-1: CCC-2 Pragmatic language subscale scores in the Support Audit subgroups: LD only, LD&EB and EB only

EB and LD sub-group n= 23 (includes 4 inconsistent), missing=2				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	5.24 (10.64)	4.67 (9.52)	3.14 (5.88)	3.57 (8.2)
Median	5 (5)	4 (3)	3 (1)	3 (1)
SD	2.14 (17.44)	2.35 (18.76)	2.53 (14.99)	2.80 (19.78)
Minimum	2 (0.5)	1 (0.5)	0 (0.5)	0 (0.5)
Maximum	12 (77)	13 (88)	11 (67)	13 (91)
EB only sub-group n=10 (includes 4 inconsistent), missing=2				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	4.90 (7.50)	6.1 (19.55)	3.70 (5.15)	2.51 (2.5)
Median	4 (1)	5.5 (10.0)	4 (3)	2.5 (1)
SD	1.45 (12.10)	2.56 (21.17)	2.06 (7.16)	1.56 (2.16)
Minimum	4 (1)	2 (0.5)	0 (0.5)	0 (0.5)
Maximum	8 (36)	10 (55)	7 (23)	4 (0.5)
LD only sub-group n=6 (includes 1 inconsistent), missing=2				
	Inapprop SS (%ile)	Stereo SS (%ile)	Context SS (%ile)	Non-verbal SS (%ile)
Mean	6.17 (13.33)	4.83 (11.75)	4.67 (15.5)	4.5 (13.83)
Median	6.5 (14.0)	4.5 (4.5)	3.0 (1.0)	3.0 (1.0)
SD	0.98 (10.69)	2.32 (14.46)	3.61 (26.75)	3.83 (27.7)
Minimum	5 (1)	2 (0.5)	2 (0.5)	2 (1)
Maximum	7 (23)	8 (36)	11 (67)	12 (70)

8.1.2 Pragmatic language composite score (PLCS)

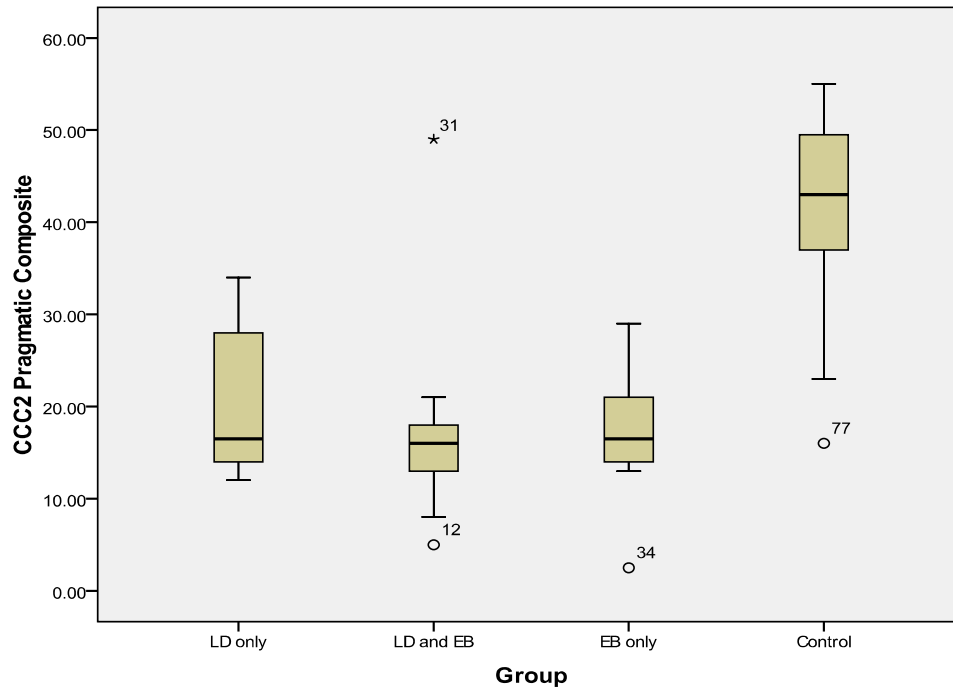
Table 8-2 displays the three sub-group and Control group scores for the CCC-2 composite score composed of the four pragmatic language subscales, the PLCS. These are also displayed as box plots in Figure 8-1 to demonstrate the spread of scores in these groups. As reported in 6.2.1.6 there are outliers in the LD&EB group (case 31) and Control group (case 77) which can again be seen in Figure 8-1. Again, scores are similar in the groups and Kruskal Wallis analysis shows no significant difference between the three subgroups in the PLCS, $H(2)=0.724$, $p=.696$.

Table 8-2: PLCS for the Support Audit subgroups and Control group

	LD	LD&EB	EB	Control
Mean	20.17	16.62	16.85	41.95
Median	16.5	16.0	16.5	43.0
SD	8.77	8.39	7.02	9.49
Minimum	12	5	2.5	16
Maximum	34	49	29	55

It is important to note that group size is very small when the Integration Support Audit group is split into sub-groups in this way (particularly for the LD-Only group). Caution is therefore required when interpreting these results. It is interesting that there is perhaps a trend towards a higher PLCS in the LD-Only subgroup and further research with larger group sizes is required.

Figure 8-2: Box plots for CCC-2 PLCS in the Support Audit subgroups and Control group



8.2 PERFORMANCE IN THE SOCIAL COGNITION TASKS

8.2.1 Happé Strange Stories

8.2.1.1 EB group

Total Mental State Scores

Comparison of the Happé Mental State scores for the EB group (including those with LD n=31) (mean=10.61, SD =3.59) and the Control group (n=42; mean=14.37, SD=3.29) showed that the EB group scored significantly lower than the Control group ($t(1)=4.69$, $p<.0001$).

Performance in Individual stories

Table 8-3 displays the mean mental state scores for the individual stories in the EB and Control groups. The results of nonparametric analysis comparing the two

groups' scores are also displayed and it can be seen that the EB group scored significantly lower than the Control group in the following stories: *White Lie (New Hat)*, *Misunderstanding (Burglar)*, *Contrary Emotions (Painting)* and *Figure of Speech (Cough)*.

Table 8-3: Happé mental state score for individual stories in the EB and Control groups with Mann Whitney analysis

Mental state answers	EB (n=35)	Control (n=41)	Mann Whitney		
Story	Mean score	Mean score	Value of U	Z score	Significance level (p)
Lie (dentist)	1.15	1.54	537.5	.074	.941
White Lie (new hat)	1.29	1.76	361.0	2.67	.008 **
Misunderstanding (burglar)	1.48	1.83	345.5	1.98	.048 *
Sarcasm (picnic)	1.29	1.34	421.5	.545	.586
Contrary emotions (painting)	1.17	1.57	388.0	2.15	.032 *
Pretend (banana)	1.69	1.97	385.0	1.77	.076
Joke (haircut)	1.71	1.91	170.0	1.34	.180
Figure of speech (cough)	1.12	1.83	117.0	3.29	.001 ***
Appearance/reality (Santa)	1.58	1.82	331.0	1.67	.094
Forgot (doll)	1.55	1.46	552.0	.717	.474
Average	1.44	1.70			

Significance levels: *** .001 ** .01, * .05

8.2.1.2 Support Audit Sub-groups

Comparisons were then made into the performance in this test across the three Support Audit subgroups: LD-Only (n=8), LD&EB (n=23) and EB-Only (n=12) and the Control group (n=42). Table 8-4 displays the range of Happé Strange Story Mental State scores for participants in these groups. These are also presented as box plots in Figure 8-3 to illustrate the range of scores.

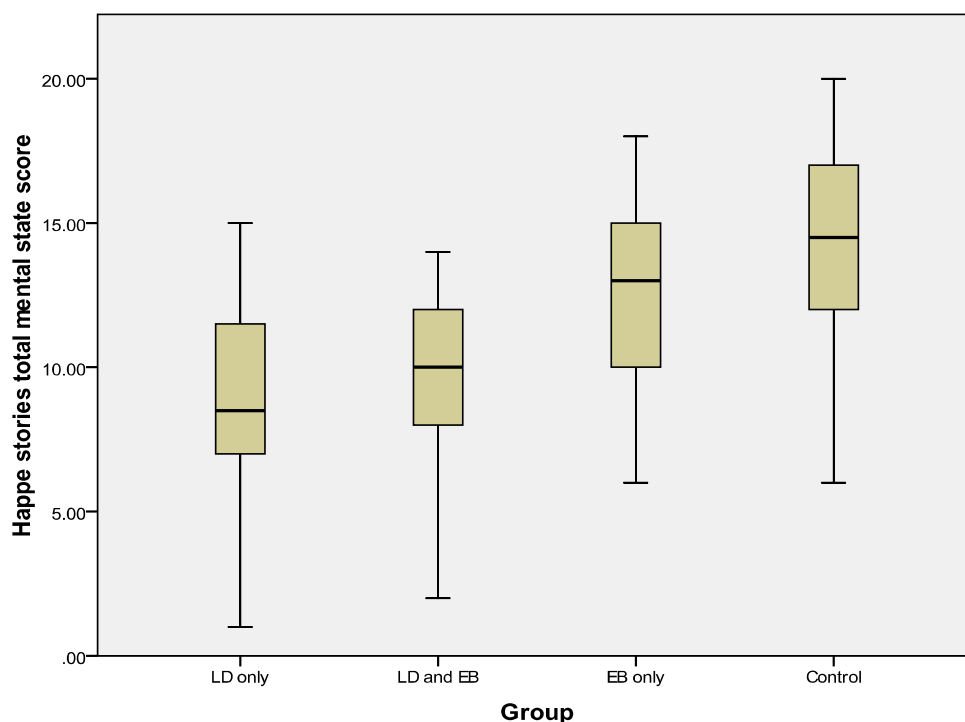
Table 8-4: Happé Stories mental state score in the Support Audit sub-groups and Control group

	LD only	LD & EB	EB only	Control
Mean	8.75	9.68	12.33	14.37
Median	8.5	10	13	14.5
SD	4.27	3.17	3.82	3.29
Minimum	1	2	6	6
Maximum	15	14	18	20

Comparison of the two groups with LD (LD-Only and LD&EB) showed that there was no significant difference in Hap   Mental State score between these groups ($U=75.00$, $z=-0.614$, $p=.539$). Comparison between the two groups without LD (EB-Only and Control) also showed no significant difference between these groups ($U=169.50$, $z=-1.54$, $p=.124$).

The comparison of most interest here is between the groups with and without LD. Therefore analysis was carried out comparing the combined LD&EB and LD-Only subgroups with the combined EB-Only and Control groups. This showed that the boys with LD scored significantly lower than the boys without LD ($U=280.5$, $z=4.83$, $p<.0001$).

Figure 8-3: Box plots for the range of Hap   mental state scores in the Support Audit subgroups and Control group



8.2.2 Second Order ToM

8.2.2.1 EB group

Cross tabs investigating the proportions in the EB group (including those with LD) and the Control group passing or failing the Second Order ToM task showed that the EB group were significantly more likely to fail this task ($\chi^2(1)=6.502$, $p=.011$).

8.2.2.2 Support Audit Sub-groups

The proportions (as a number and percentage) passing and failing the Second Order ToM task in the Support Audit subgroups (LD-Only, LD&EB and EB-Only) and the Control group are displayed in Table 8-5 and Figure 8-4 number.

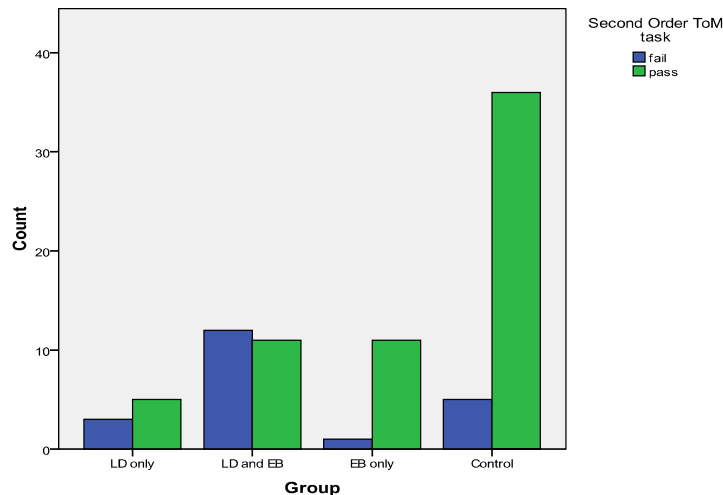
Table 8-5: Number (percentage) passing the Second Order ToM task in the three subgroups and the Control group

	LD only	LD &EB	EB	Control
Fail	3 (37.5)	12 (52.2)	1 (7.7)	5 (12.2)
Pass	5 (62.5)	11 (47.8)	12(92.3)	36 (87.8)

Comparisons between the two groups with LD (LD-Only and LD&EB) showed no significant difference in the proportions passing this task ($\chi^2(1)=.512$, $p=.685$). Likewise there was no significant difference between the two groups without LD

(EB-Only and Control groups), $\chi^2(1)=.710$, $p=.588$). Note: both of the above analyses included expected cell counts below 5 and caution is required interpreting this data.

Figure 8-4: Bar chart illustrating the numbers passing the Second Order ToM task in the Support Audit subgroups and Control group



Again, the comparison of most interest is between the groups with and without LD. Chi square analysis indicated that those with LD (LD-Only and LD&EB) were significantly more likely to fail this task than those without LD (EB-Only and Control) ($\chi^2(1)=14.33$, $p<.0001$). The proportions passing and failing these tasks are displayed in Figure 8-4 to illustrate the range of scores.

8.2.3 Hidden Emotion task

8.2.3.1 EB group

A comparison of the proportions passing and failing the Hidden Emotion task in the EB (including those with LD) and Control groups was carried out through chi square analysis. This showed that the EB group was significantly more likely to fail this task than the Control group ($\chi^2(1)=9.55$, $p=.002$).

8.2.3.2 Support Audit Sub-groups

Again, the groups were then broken down into the three Support Audit Subgroups (LD (n=8), LD&EB (n=23) and EB (n=12) and the Control group (n=42)) in order to make more detailed comparisons. Table 8-4 displays the number (percentage) passing the Hidden Emotion task in the four groups, as above.

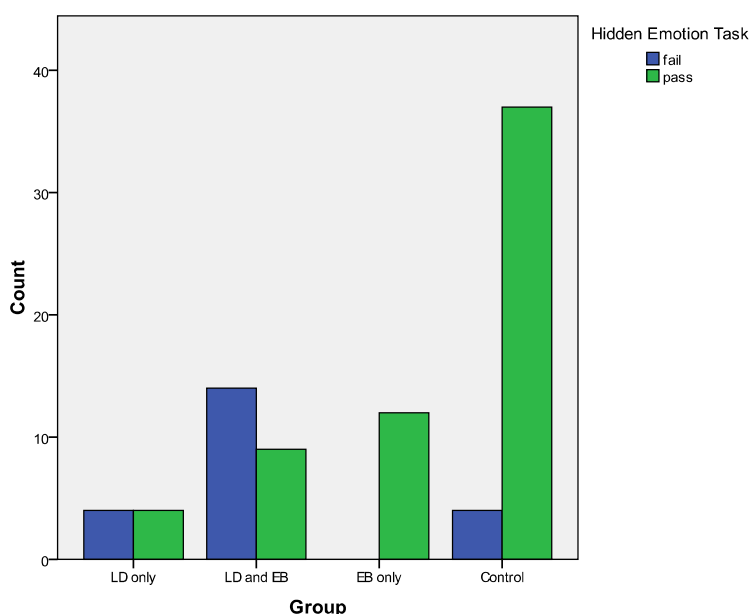
Table 8-6: Number (percentage) passing the Hidden Emotion task in the Support Audit subgroups and Control group

	LD only	LD & EB	EB	Control
Fail	4 (50.0)	14 (60.9)	0 (0)	4 (9.8)
Pass	4 (50.0)	9 (39.1)	12 (100)	37 (90.2)

Chi square analysis again shows no significant difference in the proportions passing this task in the two LD groups (LD-Only and LD&EB), $\chi^2(1)=.29$, $p=.448$. Likewise the two groups without LD (EB-Only and LD&EB) perform similarly, with no significant difference between the groups, $\chi^2(1)=1.27$, $p=.346$.

Comparisons of the groups with LD (LD-Only and LD&EB) and without LD (EB-Only and Control) showed that those with LD were significantly more likely to fail this task ($\chi^2(1)=25.82$, $p=.000$). The differences between these groups are also illustrated in Figure 8-5, to demonstrate the spread of scores.

Figure 8-5: Bar Chart illustrating the numbers passing the Hidden Emotion task in the three subgroups and the Control group



8.2.4 Summary

Across all three tests of social cognition the EB-Only group does not perform significantly differently from the Control group. The two groups with LD also do not

perform significantly differently from each other. The two LD groups perform significantly lower than the groups without LD. This indicates that performance in all these tasks is affected by low language ability but not by EB.

8.3 CHAPTER SUMMARY

The chapter started with a comparison of the pragmatic language skills of participants across the three Support Audit sub-groups and Control group. Following this the analysis for Research Questions Part 3 was presented. For each social cognition task there was a comparison of EB and Control group performance followed by a comparison of performance across the three Support Audit sub-groups. This has allowed consideration of the role of language skills.

DISCUSSION

In the Discussion section of this thesis the research questions will be discussed in three parts, linking in with their presentation order in Chapter 4 and the Results section. Chapter 9 will discuss the findings relating to Research Questions Part 1, that is, the investigations into the link between EB and other associated variables including aspects of communication skills. In Chapter 10 there will be a discussion of the findings relating to Research Questions Part 2 which focused on the group with LD and their social cognitive and friendship skills. Chapter 11 is a shorter chapter which discusses the results for Research Questions part 3, in which the analysis investigated the performance of the boys with EB in social cognition tasks and considered whether any difficulties this group presented with could be explained by a higher level of LD in this group. At the beginning of each of the above chapters, the questions and hypotheses for that section of the analysis will be put forward, with a brief discussion regarding whether the hypothesis has been met. Following this there will be a wider discussion of how the findings fit in with the existing research literature. There are two further short chapters: Chapter 12 provides a discussion of the study methodology. Chapter 13 provides a discussion of the implications of these findings for practice, future areas for research and some concluding comments.

CHAPTER 9: ASSOCIATIONS WITH EB

In this chapter there will be a discussion of the results for Research Questions Part 1. The chapter starts with a discussion of the findings regarding the level of association between EB and the variables included in the study and how the findings relate to previous research. Even with the other variables included, a particularly high level of association between communication skills and EB was found. This association will therefore be a focus of the discussion, including consideration of the possible reasons for this, and how this fits with biopsychosocial and social constructivist models.

9.1 QUESTION AND HYPOTHESIS

Part 1 Question 1: Can we demonstrate a closer association between pragmatic language skills and EB than between LD and EB while controlling for other variables that are recognised to be closely associated with LD and /or EB?

Hypothesis 1: It was predicted that of the variables measured, pragmatic language skills would be most closely associated with EB, though a close association would also be found between LD and EB.

Finding: This study replicates Mackie & Law (2010) and other recent studies (Ketelaars et al 2009; Gilmour et al 2005) in finding a particularly close association between pragmatic language difficulties and EB. There was a 20% increased chance of being in the EB group with every unit change in score in the PLCS. A close association was also found between LD and EB, with regression analysis indicating a 15% increased chance of being in the EB group with each unit change in score in the CELF-4 CLS. This was higher than with any of the other variables included and thus these findings uphold Hypothesis 1.

9.2 ASSOCIATION WITH COMMUNICATION DIFFICULTIES

9.2.1 Association with pragmatic language difficulties

One aim of the current study was to replicate the pilot study by Mackie & Law (2010) in which a close association between EB and pragmatic language difficulties was identified with a small number of participants (n=17) and thus requiring replication with a larger sample size. The current study provides this as the finding was replicated with a sample of participants with EB over the double the size (n=35). The relationship was so strong that the variable practically separated the EB and Control groups; almost all participants in the EB group had very low scores for pragmatic language skills. This study therefore adds to the building evidence for a very high level of significant pragmatic language difficulties amongst boys with EB.

9.2.2 Association with language difficulties

Of the variables that could be entering into regression analysis, language skills had the highest level of association with EB. This ties in with the large body of research that has indicated a high level of co-existence between language difficulties and SEBD as discussed in Chapter 2 (2.5). The current study demonstrates that the strong relationship holds when we look specifically at boys and EB, rather than SEBD more broadly. Furthermore when a range of other variables that are known to be associated with EB and LD are considered, there is still evidence for a particularly close association between LD and EB, thus supporting previous studies that have identified this (e.g. Beitchman 1996; Cohen et al 1993, 1998; Toppelberg & Shapiro 2000; Benner et al 2002; Ripley & Yuill 2002; Nelson et al 2005).

However it is of note that an even closer level of association was indicated between EB and pragmatic language skills. This study therefore provides some evidence to support the observation made in Mackie & Law (2010) that when considering the level of associations with EB, LD on its own does not seem to be as strong a predictor of EB as the aforementioned studies suggest. Studies such as those covered in the reviews by Benner et al (2002) and Toppelberg & Shapiro (2002), were carried out before the development of the CCC or CCC-2. They therefore were able to consider the role of pragmatic language difficulties in such a standardized and systematic way as was possible in the current study. Using the CCC-2 as a measure of pragmatic language skills the results indicate a closer association between pragmatic language difficulties and EB than LD and EB. Taken together

these findings indicate a very high level of co-existence between EB and communication difficulties.

9.2.3 Externalising behaviour versus pragmatic language difficulties

The points raised throughout Chapter 1 regarding the evolution of terminology and diagnoses are very pertinent here. As discussed, (1.5.6 and 1.5.7) pragmatic language difficulties (or PLI) is still an evolving concept, mostly used within the field of speech and language therapy. It must be highlighted that it is not being suggested that these children are presenting differently now to how they were in the past, but that our terminology and the way that we view these difficulties has changed and is still changing. Due to their differing backgrounds and areas of expertise, professionals may view these presenting difficulties differently. Professionals working in mental health settings, such as Child and Adolescent Mental Health Services (CAMHS) may view them as part and parcel of their behavioural difficulties. Speech and language therapists are perhaps more likely to recognise them as an issue with their communication skills. This has implications for the way that professionals work with these children, and the intervention that is implemented.

This study is not the first to question the distinction between pragmatic language difficulties and EB. Stringer & Clegg (2006) noted that it is very possible that difficulties with pragmatic language could be interpreted as behavioural difficulties. For example, observed behaviours such as causing disruption in group activities and conversations could be due to an underlying lack of understanding of taking turns; a failure to respond appropriately could be due to the child not picking up on nonverbal information through facial expression and tone of voice. In these examples the observed behaviour is due to an underlying difficulty with the pragmatics of language.

The converse is also possible. That is, the observed interaction style is not necessarily due to an underlying difficulty with pragmatic language but could be occurring only in particular settings due to the dynamics of that situation. For example it is conceivable that a pupil may be scored low due to being stressed and unhappy in that class, whereas in other settings their interaction style may be much more appropriate. In order to consider whether the CCC-2 is picking up difficulties that are not due to underlying issues with pragmatic language, the checklist items were

examined for areas that could be problematic for the above reasons. This was considered possible for the following checklist items:

- Does not look at the person s/he is talking too (Subscale: *Nonverbal Communication*)
- It is difficult to stop him/ her from talking (Subscale: *Inappropriate Initiation*)

In the section investigating communicative strengths and therefore whether the child lacks this strength:

- You can have an enjoyable, interesting conversation with him/her (Subscale: *Stereotyped Language*)
- Smiles appropriately when talking to people (Subscale: *Nonverbal Communication*)
- Talks to others about their interests rather than his own (Subscale: *Inappropriate Initiation*)

However there are many more items in the pragmatic subscales which indicate more pervasive difficulties, for example specific difficulties with nonverbal communication (including use and understanding of eye contact and facial expression), awareness of appropriate distance (i.e. personal space) when interacting with others, emotional awareness, turn taking in conversations, and ability to adapt communication style to different contexts. The following examples illustrate some aspects of these:

- Looks blank in situations where most children would show a clear facial expression (Sub-scale: *nonverbal communication*)
- Gets confused when a word is used with a different meaning from usual; e.g. might fail to understand if an unfriendly person was described as “cold”) (Subscale: *Use of Context*)
- Says things that he does not seem to fully understand (may appear to be repeating something he heard an adult say). (Subscale: *Stereotyped Language*)

Close examination of the patterns of responses indicate that teachers were scoring participants just as low on these test items as the ones above. This provides support for the argument that these pupils do have difficulties with their underlying pragmatic language skills and that these difficulties are likely to be present in a range of settings. However it is an omission in the current study design that there is a lack of

information about pragmatic language skills from other respondents, such as parents. This would allow us to make comparisons with their ratings in other settings and identify how specific they were to the classroom.

9.2.4 Reasons for high level of pragmatic language difficulties

It is very difficult, if not impossible, to determine the cause of pragmatic language difficulties in this group. As will now be discussed there are arguments for these difficulties being caused by a lack of opportunity to develop the skills and also for them being more pervasive in nature and therefore part of the child's biological make-up. A third possibility is that difficulties are due to problems with inhibitory control.

Lack of opportunity

As raised in Chapter 2 (2.1.3.4) and Chapter 3 (3.5) socially, both in and out of school, the important role of peer acceptance and friendship has frequently been emphasised in the literature, both for scaffolding cognitive and social skills development and for emotional wellbeing, (e.g. Hartup, 1996; Asher & Gazelle, 1999). It is within peer relationships that children practice and master critical social skills, including an understanding and respect for fair play, perspective taking and negotiation and conflict management skills (Parker, Rubin, Erath, Wojslawowicz et al 2006). With peers children can engage with fantasy play that allows them to experiment with different roles and ideas and they are exposed to rule based sequences and social conventions (Bierman, 2005). Thus friendships allow many opportunities to practice and develop social communication skills.

As discussed in 2.1.3.4, it is recognised that children with EB are often socially isolated and have difficulty forming friendships and interacting successfully with their peers. The resultant lack of opportunity to practise their social interaction skills with other children has been demonstrated to have a detrimental effect on a child's ability to develop social interaction skills at the same rate as their peers, resulting in an ever widening gap between their own and their peer's social abilities (Dodge et al, 2003) and may be observed as pragmatic language difficulties. This cycle is likely to play a role to a varying degree in the difficulties identified for many, if not all, children with EB and also (possibly co-occurring) emotional difficulties such as anxiety and depression (Bierman, 2005, Dodge et al 2003) due to the impact on self-esteem, self-image and frustration.

Limited inhibitory control

It is also possible that difficulties with social interaction are due to problems with behavioural control more than a deficit in social understanding per se. In other words their difficulties are due to executive functioning limitations; that is inhibitory control, planning and attentional flexibility. This results in difficulties reflecting on and learning from past experiences and thinking through the appropriate response before acting. As well as affecting the internalisation of control of emotions this may affect other aspects of social communication (e.g. turn taking in conversation, listening to others) and again be observed as pragmatic language difficulties (Ciairano, Visu-Petra & Settani, 2007).

Part of a pervasive disorder

A further possibility is that these difficulties with social interaction may be more pervasive in nature, as is in keeping with a diagnosis of ASD. Support for this view comes from the study by Gilmour et al (2004) (discussed in 2.6.2.3) which reported pragmatic language difficulties amongst a group of children with conduct disorder of a severity and nature very similar to a group of children with autism. In the current study too it seems that, with or without LD, participants with EB were presenting with significant levels of pragmatic language difficulties. Though there is no comparison group with ASD, the majority of participants have GCC and SIDC scores in the CCC-2 that indicate further investigations are warranted into whether an ASD diagnosis is appropriate.

At least for a proportion of these children this may therefore be a diagnostic issue. For some reason their difficulties are being recognised as behavioural rather than due to communication issues. An observation during the data collection and also in discussion with an Educational Psychologist suggests that this could be linked with SES in that children from lower SES backgrounds are more likely to have their difficulties identified as a behavioural issue than a pervasive communication issue than children from higher SES groups when perhaps presenting difficulties are similar. This is an area for future research.

It is difficult to determine the extent that any pragmatic language difficulties a child presents with are due to any one of these reasons. It is likely that for many, all or some factors contribute to different extents.

9.2.5 Potential implications of LD for pragmatic language difficulties

It might be expected that having LD would increase the likelihood of having pragmatic language difficulties. As discussed in Chapter 3 (3.5) it is recognised that children with LD are at a disadvantage when it comes to forming and maintaining friendships, having more difficulty with the underlying skills. As a result they have been shown to be more likely to have peer relationship problems (Brinton, Fujiki & Higbee 1998; Brinton, Fujiki and McKee 1998; Fujiki et al 1999; Asher & Gazelle, 1999, Durkin & Conti-Ramsden, 2007); a finding that is supported in the current study. Therefore having LD would be expected to raise the likelihood that the child will be socially isolated with reduced opportunities to practice their social communication skills. Thus the chance that a child will enter the negative cycle in which there is an ever widening gap between their abilities and their peers' (Dodge et al 2003) would be increased.

Additionally, it would be expected that children with LD will have difficulties with the internalisation of emotions and would not develop the self-regulatory "inner speech" (Vygotsky, 1986) to the level of their peers due to their language limitations and thus have more significant difficulties with inhibitory control than those without LD. This again would be expected to raise the likelihood that the child will have difficulty relating to his peers and result in an ever widening gap in abilities (Dodge et al 2003) which could contribute to observed pragmatic language difficulties.

Finally, as discussed throughout this thesis, it is increasingly recognised that there are blurred boundaries between ASD and LD. Recent research has highlighted that children with LD often have accompanying pragmatic language difficulties (Bishop & Baird 2001; Bishop 2003; Norbury et al 2006). Indeed the results of a CCC-2 validation study (Norbury et al 2006) found that the 'vast majority' of children with LD had significant pragmatic language difficulties, and that even children with what is termed 'typical SLI' (that is, were not identified as having pragmatic language difficulties) scored low on the pragmatic scales indicating more significant social communication limitations than is often considered in this group. This study provides support for the above findings: pragmatic language difficulties were highly prevalent amongst the group of boys with LD, regardless of their level of EB.

9.2.6 LD and pragmatic language difficulties in the current study

A surprising result in the current study is that, amongst the participants with EB, those with LD were not rated as having more significant pragmatic language difficulties than those without LD. It does not seem to be the case that LD was putting them at a particular disadvantage, as would be expected considering the points raised in 9.2.5. Though perhaps such a causal path makes some intuitive sense, this finding detracts from any argument that the LD is playing a causal role in the development of EB.

Though speculative it is possible that, following a biopsychosocial model, rather than the child's language limitations putting them at a disadvantage when interacting with their peers, perhaps instead it is a biological predisposition to EB (perhaps passed on from their parents, as discussed in Chapter 2, (2.1.3). Therefore a child with a difficult temperament may be raised in a home environment where one or both parents also have difficulties with their social interaction skills. This will have an impact on their ability to interact with others in a way that is considered socially acceptable at school. As a result they may find that they are increasingly socially isolated, thus setting them on a negative cycle causing an ever widening gap in ability (Dodge et al, 2003). Here their peers are wary of forming friendships with them and as a result they have reduced opportunities to develop their social interaction skills at the rate of their peers. Linked with this they may have difficulty with their inhibitory control. This would be reflected by difficulties with their pragmatic language skills.

However following this argument, it remains unexplained why so many of these pupils with both EB and pragmatic language difficulties also have LD. Following a biopsychosocial model, biological predispositions to both EB and LD are required for either to develop. The reason for predispositions to both LD and EB so often occurring together remains unexplained.

9.2.7 Teacher ratings in the CCC-2 – overly negative?

A further point of interest is that the low scores in the CCC-2 did not just relate to pragmatic language skills. Surprisingly there were no significant differences between those with EB and no LD (the EB-Only group) and those with both LD and EB (LD&EB group) in any of the CCC-2 subscale scores. Regardless of whether a participant in the EB group scored as having LD in the CELF-4 or not, teachers

tended to rate the boys in this group as having poor speech and structural language, as well as poor pragmatic language skills. This finding raises at least two possibilities.

Firstly it is possible that the teachers are taking an overly negative view of these pupils and scoring them low regardless of their actual abilities. This is supported by the fact that there were a seemingly high number of “inconsistent form” (Bishop, 2003) and the majority of these were for boys in the EB group (as presented in Chapter 6, 6.2.1.6). Close inspection of these forms did not indicate that this was due to the teacher not understanding the checklist. Though the majority of the checklist investigates communicative difficulties, the final section required the teacher to rate the child’s communicative strengths, with items such as ‘You can have an enjoyable and interesting conversation with this child.’; ‘Talks to others about their interests rather than their own.’; and ‘Talks clearly about what he/she plans to do in the future’. It can be seen that (as raised in 9.2.3) it would be possible to score a child low in these areas for reasons other than a difficulty with their communication skills. It seems that, rather than the teachers misunderstanding the change in rating for this section, for some participants teachers were tending to rating the child as not having *abilities* in these areas, though not necessarily identifying specific *difficulties* with aspects of communication in the first section either. In other words it could be that teachers were taking an overall negative view of the boys with EB.

There is evidence to support that teachers are prone to being overly negative in their views and expectations for some pupils. Biases in the academic and social expectations of teachers have been reported and these have been shown to be against boys, particularly those from low SES backgrounds (Tournaki, 2003; Auwarter & Aruguete, 2008) as well as pupils with ADHD (Eisenberg & Schneider 2007). However to the author’s knowledge there have not been investigations into whether a teacher will view a boy with EB negatively regarding aspects of his speech and structural language skills, as this study indicates is possible.

A second possibility is that functionally these boys do have difficulties with these aspects of communication in the classroom setting. Again, though speculative, this would fit with both a biopsychosocial model and a social constructivist accounts of EB (as discussed in Chapter 2) that these difficulties develop through their interactions with others. A child may come to school with an interaction style that is

not considered appropriate in the school environment, though perhaps considered normal within the home. The child can therefore struggle to fit in with the expectations of the teacher and perhaps other pupils in the class and stress and anxiety in the classroom setting could exacerbate problems. The child may get locked into a negative cycle of behaviour and interaction style within a particular setting but this interaction style may not be seen or not be considered problematic in other settings such as the home (Bennett, 2005; Pomerantz, 2005). Again, as raised in this chapter (9.1.4.1) it would be valuable to have CCC-2 forms completed by parents, (and perhaps if possible professionals who work with these children in other settings) with which to make comparisons. This would allow consideration of whether these communication difficulties were evident outside of the school setting.

9.2.8 Summary

In summary, this study has identified a particularly high level of association between communication difficulties and EB, even when other factors known to be associated with EB are considered. Possible reasons for the particularly high level of pragmatic language difficulties have been discussed as well as consideration of the high level of LD amongst these pupils.

9.3 ASSOCIATION WITH OTHER ASPECTS OF CHILD ABILITY

Regression analysis reported in 6.3.1 showed significant associations between EB and both word decoding and non verbal cognitive ability; with each unit change in the TOWRE score there was a 5% increase in the chance that a participant was in the EB group and for the WASI there was found to be an 8% increased chance. However, these values were considerably lower than those found for either language skills or pragmatic language skills and both these variables were no longer significantly predictive when entered together with language skills into a multiple logistic regression analysis.

9.3.1 Associations with nonverbal cognitive skills

This study addressed an issue with many previous studies by providing assessment information about nonverbal cognitive skills. As raised in Chapter 2 (2.6.2.2), there

are questions regarding whether the association between LD and EB is actually an association between general learning difficulties and EB rather than language specifically. In this study the EB group scored significantly lower for nonverbal cognitive skills than the Control group, however their scores were, in the main, within the average range. Thus, though there is some evidence of a link between a lower level of nonverbal cognitive ability and EB, the strength of association is not as strong as the association between LD and EB. This study therefore supports previous research reported in Chapter 2, (2.6.2.2) that has proposed a specific link between LD and EB rather than general learning difficulties and EB (Ripley & Yuill, 2005; Mackie & Law, 2010). Both these studies were unusual in that they carried out assessment of nonverbal cognitive ability.

To some extent the study's findings contradict those of the two other studies discussed in 2.6.2.2 (Benasich et al 1993 and Snowling et al 2006). These studies also considered the role of nonverbal cognitive skills and proposed a closer link between aspects of SEBD and nonverbal cognitive abilities than between SEBD and language skills specifically. As discussed, Benasich et al (1993) found that nonverbal cognitive ability was most predictive of behavioural problems rather than LD, prompting them to propose that lower IQ generally was more closely linked with EB rather than LD per se. However it should be noted that theirs was a longitudinal study in which they found a decline in nonverbal IQ was most predictive of *continuing* EB. Their study also involved children of a younger age (between the ages of 4 and 8 years), again limiting the extent direct comparisons can be made.

The second study by Snowling et al (2006) followed up children identified with LD at age 5 years into their teens. Again it was low nonverbal IQ which was most predictive of enduring psychological and social issues at age 15 years, rather than language skills specifically. However, as with Benasich et al's (1993) study, there are limits in the extent direct comparisons can be made. The participants in the current study are younger than those in Snowling et al's (2006) which, furthermore, is another longitudinal study. The question of which participants in the current study will continue to have difficulties at an older age was not addressed, though is one of some importance. There would be value in revisiting participants in the current study as they reach their teens and adulthood to investigate long term outcomes and predictors of long term issues with behaviour, emotional wellbeing and social adjustment.

Nevertheless, the current study's finding does provide evidence that it is difficulty with communication that is more closely linked with EB rather than general learning difficulties. There are many studies that highlight the link between EB and general learning difficulties or developmental delays (e.g. Hinshaw, 1992; Merrell & Hollan, 1997; Keogh & Bernheimer, 1998; Feldmann; Hancock, Rielly, Minnes & Cairns, 2000; Baker, Blacher & Olsson, 2005) rather than recognising that the relationship is more specific than this. This specific link with communication needs to be better recognised and will help in the development of our assessment and intervention for these children.

9.3.2 Associations with word decoding skills

As expected word decoding ability was also found to be significantly associated with EB, again linking in with previous research as discussed Chapter 2 (2.6.2.1) (McGee, 1986; Hinshaw, 1992; Carroll et al 2005; Morgan et al 2008). However, regression analysis indicated that the association was the weakest of the aspects of child ability investigated. It is of note too that many participants in the EB group scored well in this assessment, with some scoring above the average range.

This study therefore supports the study by Conti-Ramsden & Botting (2004) that found that aspects of *verbal* communication were more closely linked with poor social adjustment than reading ability. It should be noted however that their measure of EB was not directly comparable to that of the current study as they looked at social adjustment rather than EB and, furthermore, their participants were children who attended specialist provisions for language difficulties. This again is not directly comparable to the participants with EB in mainstream settings as in the current study.

The findings contradict those of Tomblin et al (2000) who found reading ability to be predictive of EB rather than verbal language ability. However a difference in assessment may be the reason for this. In Tomblin et al's study (2000), their assessment included reading comprehension, whereas in the current study the focus was on word decoding only. Understandably children with receptive verbal language difficulties will commonly have reading comprehension difficulties due to the demands on their receptive language skills (Snowling & Hayiou-Thomas 2006; St Clair, Durkin, Conti-Ramsden & Pickles, 2010). The ability to read is a complex skill that draws on many different cognitive skills, including many different aspects of

communication skills (speech, semantics, syntax and grammar and pragmatics, Snowling & Hayiou-Thomas, 2006). Therefore different measures of reading skills may find closer or weaker levels of association with EB depending on the aspects of reading included in the assessment. In the current study word decoding specifically was found to have a lower level of association with EB than verbal language skills; a broader assessment of reading (as included by Tomblin et al 2000) may have found a closer association with EB.

In the current study, the high level of pragmatic language difficulties in the EB group is of interest with regard to literacy. The written aspects of pragmatic language include the ability to make inferences, non-literal understanding and higher level language skills such as reasoning, using world knowledge to interpret text etc. These aspects of reading comprehension play a significant part in our ability to interpret text (Snowling & Hayiou-Thomas 2006). As there were few participants with EB who did not have pragmatic language difficulties, this would imply that almost all participants are likely to have reading comprehension difficulties of some sort. Consideration of the pragmatic language aspects of reading and the association between difficulties in this area and EB has not been investigated, to the author's knowledge.

9.4 ASSOCIATIONS BETWEEN EB AND THE ENVIRONMENTAL FACTORS

Significant associations between EB and the environmental measures included in the current study were also found. Of the three measures, parenting stress (as measured in the parent domain measure of the PSI) was more closely associated with EB than either maternal education level or the adults at home variables. These three variables will now be discussed in turn.

9.4.1 Associations with parenting stress

To recap, as discussed in Chapter 2, (2.6.1.1) the Parenting Stress Index (PSI) was included to give an indicator of parental mental health, particularly in relation to bringing up their child (or children). Bayer et al (2008) found parenting stress (and also harsh discipline) were the two most consistent predictors (from a range of environmental measures) of EB amongst children followed up to the age of 3 years. Though a much older age group, the current study provides some support for this

finding with results indicating that this association perhaps continues as the child reaches middle childhood.

It should be highlighted, however, that the PSI Parent Domain mean and median scores in both the EB and the Control group were within the average range. This indicates that on the whole parents in both groups did not have difficulties in these areas to a level causing concern. However, there was a small number who were scoring high in some sub-domains, and this was more often the case for parents in the EB group than the Control group. Though parents of the boys in the EB group scored lower than the control group in all sub-domains, the difference was not significant for all. There was no significant difference between the groups in the sub domains that measured *Health*, *Role Restriction*, *Depression* and *Spouse* and a significant difference for *Competence*, *Attachment* and *Isolation*. These sub-domains will now be discussed.

Health

As raised in the literature review, there is a higher rate of poorer health in areas of social disadvantage than in higher SES areas (Meltzer, Fryer & Jenkins 2004). Any difference in *Health* score is therefore potentially attributable to differences in SES. As the groups in the current study were well matched for SES this indicates that having a child with EB is not significantly associated with differences in health.

Role Restriction

It would perhaps be expected that the parents of children with EB would report more feelings of being restricted in their ability to maintain their own identity and freedom and of being dominated and controlled by their child's needs, as this subscale is designed to investigate. This was not found to be the case. Though the parents in the EB group did score higher, the difference was not significant.

Depression

Again it is surprising that parents of boys in the EB group did not score significantly higher in the *Depression* subscale than parents of boys in the Control group. As discussed in Chapter 2 (2.1.3), a link between maternal depression and child conduct disorder has been identified. Research that has identified this link has, however, concentrated on maternal depression with regard to interactions with their child in the early years and with a focus on the quality of mother-child attachment

(Cicchetti et al 1998; Teti et al 1995). Studies such as those by Kim-Cohen et al (2005) and also Campbell et al (2004) have then followed up these children of depressed mothers into the preschool and school years and found higher rates of conduct difficulties.

There is less known about the link between EB in older children (as in the current study) and concurrent maternal depression. It could be that though their mental wellbeing has improved and thus the PSI did not pick up on any difficulties, at least some of these mothers suffered depression in the child's early years and it is likely that this depression in early years will have an ongoing impact on their child's behaviour and adjustment into middle childhood as found by Kim-Cohen et al (2005). It is also possible that a fuller assessment specifically designed to investigate depression would have picked up on difficulties more successfully here. At least one mother commented that she had been taking anti-depressants for some time. This mother's scores on this subscale did not indicate any cause for concern but it can be assumed that for a period of time the parent-child relationship was affected by her depressed mood. It is not known how many other parent-child relationships of participants in the current study will also have been affected by depression at some earlier stage in the child's life, or the impact of this.

Spouse

Another perhaps unexpected result is that the EB group did not score significantly lower than the Control group in the *Spouse* subscale. This subscale investigated whether the parent perceived that they were receiving the emotional and practical support they expected from the other parent with regard to child management. As discussed in 2.1.3, there is evidence that family interaction style and parental aggression is linked with EB. Though not investigated specifically in this subscale it would perhaps be expected that this would also involve feelings of a lack of emotional and practical support from their partner. However, the result indicates no significant difference between parents in the EB and Control groups. Though parents of boys in the EB group were significantly less likely to live with the child's other biological parent, it does not seem to follow that they did not feel that the child's father (or mother) was not contributing to child management as they expected. Responses indicated that the majority of parents of participants in both groups felt reasonably well supported and this was not significantly associated with whether their child presented with EB or not.

Competence

A low score in the *Competence* sub domain indicates a lack of self esteem as a parent and/ or awareness of difficulties raising their child. The finding that the parents of boys in the EB group had significantly higher scores in this area is therefore to be expected. This measure cannot tell us whether these parents actually have poorer parenting skills; rather it indicates that the parent's own perception is that they do. As discussed in 2.1.3, it is difficult to determine cause and effect here. A child with EB will be more difficult to parent, and it may well be that the parent feels that the child's difficulties are their fault and due to their lack of good parenting skills. Conversely, their child's EB may indeed be influenced by their lack of effective parenting skills. It is likely, following a biopsychosocial model, that in most cases a combination of both factors will be coming into effect to some extent.

Attachment

The link between attachment and EB is well documented, and is associated with maternal depression (Teti et al 1995; Cicchetti et al 1998) and was raised in 2.1.3. The finding that parents in the EB group reported more significant difficulties in this area is to be expected and fits in with this well established association.

Isolation

A high score in the *Isolation* sub domain indicates a feeling of social isolation from peers, relatives and other emotional support. It is therefore an approximate measure of a parent's social capital, which is established to be linked with mental health. As discussed in 2.1.3, there is evidence that the social capital of a parent is likely to have an impact on the child (Dodge & Pettit 2003). The finding of significantly higher scores in the *Isolation* subscale amongst parents in the EB group provides some support for this.

9.4.1.1 Life stress

It is of note that the level of *Life Stress* reported by parents in the EB and Control groups is very similar. This indicates that recent family issues such as breakups, deaths, or other big changes in the family are not significantly associated with EB. However, it is possible that rather than the event occurring being linked with EB it is the family's way of coping and/ or the child's personality and temperament (Daniel & Wassell, 2002).

9.4.2 Associations with maternal education

As discussed in the methodology (5.1.8), maternal education is sometimes used as a proxy for social disadvantage (Ginsborg, 2006). As groups were matched by SIMD scores, it might be expected that maternal education levels would also be similar in the EB and Control groups; however this was not found. Regression analysis indicated that this variable significantly predicted group membership, with a participant with a mother with low levels of education three times more likely to be in the EB group than the Control group.

The SIMD considers a broader range of factors and therefore is a more accurate guide of the level of deprivation in a given area. Maternal education, on the other hand, gives information about a particular family. It seems that the link with EB is something more specifically connected with maternal education level and, therefore, individual families rather than the area that the family live in. It is recognised that maternal education is linked with knowledge about parenting and appropriate levels of stimulation in the home (Parks & Smeriglio, 1986). Studies have identified an association between harsh, restrictive and authoritarian parenting, social disadvantage (and therefore lower levels of education) and EB (Hashima & Amato, 1994, see also Hill, 2002 for review). Again, causal pathways are difficult to establish here. As already raised in 2.1.3.2 this interaction style may be used out of desperation with a child with a difficult temperament and thus the parent-child relationship can be locked in a negative pattern (Hill, 2002).

9.4.3 Associations with adults at home

A significant link was also found between EB and whether a child lived with both parents or not, with regression analysis indicating that participants in the Control group were four times more likely to live with both parents than those in the EB group. As raised in 2.1.3 previous research has indicated that though it may appear that there is an association between EB and lone parenting, the links are in fact between factors associated with social deprivation (where there are higher rates of lone and separated parents) and EB, rather than marital status per se (Clarke-Stewart et al 2000). In the current study, the significant association between whether a child lives with both parents or not and EB is perhaps surprising, when we consider that there was no significant difference between parents in the EB and Control groups in the *Spouse* sub-domain of the PSI. This indicates that parents in

the EB group were not feeling particularly unsupported by the child's other parent, although they were less likely to live with them and more likely to have a child with EB (for whom it would be expected high levels of support would be required).

As Hill (2002) states there is evidence that repeated exposure to family stress such as parental conflict lowers a child's threshold for psychological dysregulation which can lead to EB. This is as possible in a family where both parents live together as one in which there is a parent living with a new partner. As discussed in 2.1.3, marital conflict has been shown to have an impact on children's behaviour (Davis & Cummings 1994; Osofsky, 1995; Hill 2002). Level of parental aggression and conflict is perhaps a more important measure when considering associations with EB in children, than whether the child's parents live together.

9.5 WHAT THIS STUDY ADDS TO OUR UNDERSTANDING OF THE MECHANISM UNDERLYING THE LINK BETWEEN LD AND EB

An aim of the current study was to consider strengths of association with EB in order to help shed light on the mechanism underlying the recognised association between LD and EB. Earlier studies considered causal pathways between LD and EB (Rutter & Lord, 1987) but more recent research indicates that the interactions between LD, EB and other associated variables are far more complex than this. Research in the last couple of decades has done much to explain the development of EB and many variables have been shown to be significantly associated with EB (see Hill, 2002). Many authors have framed explanations within a biopsychosocial model (e.g. Dodge & Pettit 2003; Cooper 1997, 1999, 2006; Hill 2002).

In the current study significant levels of association were found between all the variables included and EB, as would be expected following a biopsychosocial model that proposes that a range of factors will interact for different individuals in the exacerbation or reduction of presenting difficulties. However the results indicate that, over and above this, language and pragmatic language skills are particularly closely associated with EB. This indicates that even when other variables are controlled for, there is a specific and strong link between communication difficulties and EB.

Research to date has demonstrated that a number of factors are more likely to be problematic for pupils with LD. As discussed throughout this thesis, we know that

children with LD are more likely to have difficulty with the internalisation of control of emotions, peer relationships, reading and accessing the curriculum. They are also more likely to have accompanying low nonverbal IQ and/ or present with LD as part of a pervasive disorder. It is possible that any of these factors could be linked with higher rates of EB and that perhaps LD plays a causal role in the development of EB.

Though a strong association between communication and EB was identified, the results of this study do not allow us to conclude that LD leads to EB, or that having LD is linked with more severe difficulties. Pragmatic language difficulties were similar whether participants had LD or not (according to teacher rating), and all pupils with EB were presenting with difficulties of a similar level of severity as rated by parents and teacher in the SDQ. This finding therefore supports Clegg et al (2009) who stated that “any assumptions that language difficulties lead directly to behaviour problems should be challenged” (Clegg et al, 2009, p 134). They highlighted the need to establish the precise nature of this relationship and hypothesise that it is other factors such as those relating to social disadvantage that are allowing for this relationship of coexistence. Though the current study has sought to shed light on this, the inter-relationship is clearly complex and further research is still required.

9.6 CHAPTER SUMMARY

This chapter provided a discussion of the research findings for Research Questions Part 1. A strong association between EB and communication skills was found, even when other commonly occurring variables were controlled for. The possible reasons for this were discussed, linking in with previous research. The findings regarding the levels of association between EB and nonverbal cognitive skills, word decoding, parenting stress, maternal education and adults at home were also discussed, with reference to previous research in these areas. The chapter ended with a discussion of what these findings contribute to our understanding of the mechanism underlying the recognised link between LD and EB within a biopsychosocial model of development.

CHAPTER 10: SOCIAL COGNITION & FRIENDSHIP IN BOYS WITH LD

This chapter provides a discussion of the findings for Research Question, Part 2 in which the focus is the group of boys with LD. The chapter starts with a discussion of the LD and the Control group performance in the three tests of social cognition: the Happé Strange Stories, the Scale of ToM and the Second order ToM task. Comparisons are made to previous research in this area. Following this, the discussion turns to the levels of association between performance in these tasks and aspects of communication skills, age and nonverbal cognitive ability. Finally there is a discussion of the findings regarding friendship in boys with LD. Again comparisons are made with previous research. Each section starts by restating the research question, hypotheses and a summary of the findings.

10.1 SOCIAL COGNITION OF BOYS WITH LD

10.1.1 Research question and hypothesis

Part 2 Question 2.1: How do boys with LD perform in tests of social cognition compared with a TD control group?

Hypothesis 2.1: Boys with LD will score significantly lower than boys in the typically developing control group in tests of social cognition

Finding: The group of boys with LD performed significantly lower than the Control group in all three social cognition tasks, thus upholding hypothesis 2.1.

10.1.2 General overview

This finding supports previous studies investigating the social cognitive ability of children with LD which have found a delay in ability compared to typically developing peers (Farmer 2000; Miller 2001; Marton 2005; Gillott et al 2004; Farrant et al 2006). This is contrary to studies that have found children with LD to perform similarly to typically developing control groups (Leslie & Firth, 1988; Shields et al 1996; Ziatas et al 1998). It seems likely that, as Farrant et al (2006) pointed out, the reason

studies such as Leslie & Frith (1988) found no difference between LD and Control children was that they used the false belief task only and their participant groups were older than the typical age a child passes this task. Performance in each of the three tasks social cognition tasks will now be discussed.

10.1.3 Happé Strange Stories

10.1.3.1 Comparison between LD and Control groups

Boys with LD were found to have more difficulty understanding and/or verbalising an appropriate response to these stories than their typically developing peers. The group scored significantly lower in their mental state score than the Control group, supporting the findings of Gillott et al (2004) and Farmer (2000), discussed in Chapter 3 (3.4.1), that children with LD have difficulties with this task when compared with their typically developing peers.

Physical State Answers

As reported in chapter 9 (9.2.6) participants in the LD group have high levels of pragmatic language difficulties and therefore it may be expected that responses would be similar to those reported in studies investigating ability in children with ASD. That is, they will be more likely to give a physical state answer or an inappropriate mental state answer. This was found to some extent: as a group their mean Physical State Score was significantly higher than the Control group's. However, the mean physical state score in the LD group is low at 3.43, indicating that on average they gave less than 2 physical state responses to the 10 stories. In the Control group too, participants gave physical state answers, with an average of just over one correct physical state answer (mean score 2.27). Therefore in both groups physical state responses were relatively uncommon, indicating that the majority understood the mental state aspect of the story.

Inappropriate Mental State Answers (0M)

Comparison of the number of inappropriate mental state (0M) responses amongst participants showed that boys in both groups gave inappropriate responses. However participants in the LD group were more likely to give a 0M response for four stories (*White Lie (New Hat)*, *Pretend (Banana)*, *Joke (Haircut)* and *Forgot (Doll)*), indicating that significantly more participants in the LD group had trouble understanding their intended non-literal meaning than in the Control group. For the

remaining six stories there was no significant difference between the groups, indicating that some stories seem to be more problematic than others.

To some extent this finding ties in with previous studies that have used the Happé strange stories with children with LD. Farmer (2000) noted that both LD and typically developing children gave OM responses. However, Gillott et al (2004) noted that though their LD group did not provide appropriate mental state scores as much as their typically developing group, they were not more likely to produce an inappropriate mental state score. This is somewhat different to our finding in which some stories did prompt significantly more inappropriate mental state answers.

10.1.3.2 Comparison with O'Hare et al's (2009) study

The mean scores for O'Hare et al's study (2009) were calculated for the same age range (8;00 to 11;11) as in the current study and were presented in Table 7-7. An unexpected result is that for many stories, both groups in the current study scored higher than the typically developing group in O'Hare et al's (2009) study. In the current study, efforts were made to ensure that the scoring system was the same as O'Hare et al's (2009) study, through involving one of their research team in the inter-rater reliability check. As seen in the Table 5-2, inter-rater reliability was good so the higher scores are not due to differences in scoring criteria. The same script and procedure for presenting the stories was also used in both studies. A total of 140 children aged between 5;0 and 12;11 (49% boys and 51% girls) took part in O'Hare et al's (2009) study. They found that any difference for sex was at or little different from chance level and therefore it is also unlikely that the difference in scores is due to the current study including boys only.

O'Hare et al (2009) does not provide data on exactly how many children are in each age range other than "they were evenly distributed across each age band from 5 to 12 years" (O'Hare et al, 2009). As there are eight age bands (an age band is one year group) this puts approximately 15 to 20 children in each band. The mean scores for four age bands (8;00 to 11;11 years) were calculated in order to make comparisons with the current study, giving a total of approximately 70 children in the 8;00 to 11;11 year age group. Though in the current study the total number of typically developing participants between these ages is even lower (n=42), this is a very small number for calculating standardised data. Though it remains unclear why there is such a difference in mean scores in the two studies, this highlights the need

for the collection of more normative data with bigger samples, including checks on inter-rater reliability for both scoring and presenting the tasks.

10.1.3.2 Responses to individual stories

O'Hare et al (2009) found that the *Sarcasm* story was particularly difficult for typically developing children even up to the age of 12 years, with a mean mental state score of 0.86. This was also the story that obtained the lowest mean score for the Control group in the current study (mean score 1.34). However this score is considerably higher than the score in O'Hare et al's sample. Furthermore the LD and Control groups scored very similarly in this story with the LD group also scoring considerably higher than O'Hare et al's typically developing group (with a mean score at 1.24).

In the current study the LD group achieved significantly lower Mental State scores than the Control group for the following stories: *White lie (hat)*, *Misunderstanding (burglar)*, *Contrary Emotions (painting)*, *Pretend (banana)*, *Joke (haircut)*, and *Figure of Speech (cough)*. A lack of a score in these stories indicates that they either gave an inappropriate mental state answer or a physical state answer (which is not the answer the story was intended to elicit but may not necessarily be technically wrong). Three of these stories are also ones in which boys in the LD group were significantly more likely to give a 0M answer (*White lie (hat)*, *Pretend (banana)*, *Joke (haircut)*). This indicates that these stories most effectively distinguished the groups.

The fact that so many of the LD group scored low in the *Pretend (banana)* story is of particular interest. Five participants in the LD group gave a mental state answer that warranted no score, whereas no child in the Control group gave such an answer. This story is very short and on first impressions perhaps seems one of the easier stories for both linguistic and information processing demands (see Appendix I). It was expected that some of the longer and more complex stories (for example the *Misunderstanding (burglar)* story (see Appendix I) would elicit more 0M answers. Though the LD group did score lower for Mental state score in this story, this was found not to be the case.

10.1.4 Second Order ToM task

In the Second Order ToM task, again the LD group scored significantly lower than the Control group. The inclusion of comprehension questions and a linguistic control question allowed the consideration of whether difficulties with this task were to do with the specific ToM question, or (though reduced as much as possible) the linguistic and /or information processing demands. This result partly supports Farmer (2000) who found that one of her groups of children with LD performed more poorly than an age matched control group. However this applied to her group in special school only, rather than her group with LD in mainstream school as in the current study. Her group with LD in mainstream did not perform significantly differently from the typically developing groups.

The fact that all participants in both groups passed the comprehension questions indicates that all understood the story. In the LD group a considerable proportion (almost 40%) failed both the linguistic control question and the ToM question and for these participants it is not possible to say whether it is the linguistic form of the question or the social cognitive aspect of the task that was the problem. It seems likely that the complexity of the sentence grammar did play a role, however, when the responses of those in the LD group who passed this task (approximately 40% of the group) are considered. Even these participants seemed to have some difficulty with the linguistic form of the ToM question (see Appendix III). Though response time was not measured it was observed that they were more likely to take longer to respond. They were also more likely to change their mind. In fact, (as shown in Table 7-9) half of those who passed initially indicated the wrong location for the chocolate until they were asked the follow up question, "*Why does Ryan think that?*". This prompted them to revise their initial answer from the incorrect location (the bag) to the correct one (the fridge) (see Appendix III). This indicates a weaker understanding of this grammatical construct amongst a number of participants, as would be expected considering their difficulties with language. However, with processing time their understanding of the story seemed to help them grasp the meaning of the question and the expected answer and with the allowance to revise their answer, they were able to demonstrate understanding of the social cognitive aspect of the story. This processing and revision time is something that is unlikely to be available to them in their everyday interactions and it is notable that it was not required by the participants in the Control group.

10.1.5 Scale of ToM

As reported in 7.2.3, both LD and Control groups performed at, or close to, ceiling for the first four tasks in this scale. It was the fifth and final task, the Hidden Emotion task, which differentiated the groups. Approximately half the participants in the LD group had difficulty with this task, whereas the Control group again scored close to ceiling. This task was therefore the focus of the analysis.

10.1.5.1 Hidden Emotion task

In the current study efforts were made to reduce the information processing and linguistic demands of the task through changing the wording of the story to reduce the linguistic complexity and using pictures to back up the story. Previous studies have not included as many pictures to support the verbal information as in the current study. Presentations by Wellman & Lui (2004), Peterson et al (2005) and Farrant et al (2006) have included a picture of the back of the boy's head along with three possible facial expressions (happy, sad and neutral). The extra picture (see Appendix II) to cue the child into the theme of the story may have helped focus participants into the story and aid their comprehension. Even with these adjustments it is of note that about half of the participants with LD in current study still had difficulty with the task.

With their younger age group, Farrant et al (2006) found that children with LD aged approximately 5 years old did not seem to comprehend the Hidden Emotion task and therefore excluded it from their analysis. Participants in the current study are considerably older, with a mean age of approximately 10 years old. Unlike in Farrant et al's study, appropriate responses to the comprehension questions were given by all in the LD group, indicating that it was not difficulty with the information processing demands and linguistic complexity that was the issue for this group but the understanding of mental states.

In the development of the scale, Wellman and Lui (2004)'s found that the typical developmental pattern was to pass the 5 tasks in order. As the LD group in the current study only had difficulty with the final task, with the majority passing all others this is in keeping with this finding and indicates that ability is delayed for this group, rather than following an abnormal path. This is contrary to Peterson et al's (2005) finding that the order of passing the last two tasks was reversed amongst a group of children with autism. The high level of pragmatic language difficulties in the

LD group might suggest that the group would follow a similar pattern to a group with autism, but this was not found to be the case.

As discussed in Chapter 3, (3.4.1.4), Peterson et al (2005) suggest that this finding provides evidence that the autistic group are processing the task differently. However the wording of the narrative suggests another possibility. In this task, children are told “...*But the boy did not want the others to see how he felt. If they saw how he felt, they would call him a baby*”, followed by “*Why did Matt try to look _____?*” (with the facial expression the child indicated inserted in the blank). Therefore all the child has to say in response to this question was to repeat back the reason given by the examiner (*because they would call him a baby*) without necessarily really understanding *why*. It may be that the children with autism in their study did not have actual understanding of this task, but were more able to echo back the required response.

In the current study, the statement “*If they saw how he felt, they would call him a baby*” was omitted and replaced by “*Matt tried to hide how he felt*” (as was used by Farrant et al 2006). Therefore responses with a justification can more confidently be taken to indicate actual understanding of the story and Matt’s mental state.

10.2 PREDICTORS OF PERFORMANCE IN SOCIAL COGNITION TASKS

10.2.1 Research question and hypothesis

Part 2 Question 2.1.1: What predicts performance in these social cognition tests amongst boys with LD?

Hypothesis 2.1.1: Due to the lack of previous research investigating this, no hypothesis was provided for this question

Finding: Though strengths of association were not strong, different aspects of ability were found to be associated with different tests of social cognition. The Happé Strange Stories were associated with language skills; the Hidden Emotion task and the Second Order ToM task were associated with pragmatic language skills. These findings will now be discussed in more detail.

10.2.2 Happé Strange Stories

LD group

Though there is a reasonable spread of ages (from approximately 8 to 12 years) in the LD group, no correlation was found between age and mental state score in the Happé Strange Stories. As this is an age range where big advances are made in understanding more complex aspects of social cognition (Harris 1998; Lewis 1993; Raikes & Thomson, 2005; Harter & Budin 1989) it would be expected that correspondingly an improvement in mental state score with age would be observed. This was not the case. O'Hare et al (2009) did find an association between age and mental state score. However, as well as looking at typically developing children only, O'Hare et al (2009) included a wider range of ages than in the current study. Inclusion of younger children is likely to be contributing to this association.

As discussed in Chapter 3 (3.4.1.2), Happé (1995) and Gillott et al (2004) queried whether it was linguistic ability specifically or nonverbal cognitive ability that was more important for passing tests of ToM. Inclusion of a measure of nonverbal cognitive skills in the current study allowed us to identify that in our sample it was verbal abilities specifically that were associated with performance in the Happé Strange Stories, rather than nonverbal cognitive abilities. Almost no correlation was found between WASI score and Happé Mental State score.

The finding that, of all the variables investigated, the three CELF-4 composite scores are the three most closely associated with Happé Mental state score is of interest. This indicates that language ability is more important than pragmatic skills, (or indeed age or nonverbal cognitive ability) to score highly in this test. Though as discussed in Chapter 3 language and social cognition are intertwined and depend on each other, it looks likely that at least some incorrect responses in the LD group can be attributed to a lack of the necessary linguistic skills rather than difficulty with social cognition.

Furthermore, though the difference is small, it is interesting that the CELF-4 ELI composite score correlates more closely with Happé mental state score than CELF-4 RLI. This indicates that perhaps the problem lies to a larger extent with the ability to formulate an appropriate response than the ability to follow and understand the story. This was suggested by Gillott et al (2004) as a reason for their LD group's difficulty with the task; their pattern of responses indicated their linguistic deficit and subsequent difficulty in expressing complex propositions was perhaps the issue,

rather than social cognition. Further research is necessary to investigate this more fully. The CELF-4 ELI, though a composite score, is limited in the range of aspects of expressive language it investigates. Fuller assessment of expressive grammar, semantics and narrative skills and a larger sample would be valuable to investigate this further.

As the Happé Strange Stories are designed as an assessment of the ability to read social situations from the context and not the literal interpretation, it would be expected that they would be problematic for those with pragmatic language difficulties. It is therefore surprising that a lower level of association between CCC-2 PLCS and Happé Stories mental state score was found than between Happé mental state score and with structural language skills (CELF-4 CLS). This finding is in keeping with Norbury (2005) discussed in Chapter 3 (3.4.1.2). She found that metaphor ability was associated with language skills rather than ToM ability. Likewise in the current study, structural language limitations were associated with difficulties with these figurative and non-literal language tasks.

Control group

Interestingly there were no significant correlations between any aspect of ability and Happé Mental State score for the Control group. Again, unlike O'Hare et al (2009), there was no significant correlation with age (though this variable did have the highest correlation with Mental State score of the variables included at .27). Again, it should be considered that the age range in the current study is smaller than that in O'Hare et al's (2009) and it may be that the biggest changes in ability are amongst the younger children in their sample (5;00 to 8;00).

10.2.3 Second Order ToM task (LD group)

As raised in Chapter 3 (3.1.3) concerns have been voiced in the literature (notably by Sullivan et al 1994) about the linguistic complexity of the ToM question in the second order ToM task. It would perhaps therefore be expected that structural language measure (CELF-4 composite scores) would be significantly associated with this task. However, the results indicate that though approximately half of the LD group failed this task, this is not strongly associated with their language limitations. Indeed contrary to this expectation in the current study there was no significant correlation between passing or failing this task and any of the three CELF-4 composite scores. As discussed, considerable efforts were made to reduce the

linguistic and information processing demands of the task by selecting a script that had been designed to minimise the linguistic demands (Sullivan et al 1994) and devising a comic strip picture support to go alongside the story (see Appendix III). The lack of association between structural language skills and passing and failing may in part be due to these supports. However it should be acknowledged that, as there was not a group who were presented this task without these supports, it is not possible to determine their effectiveness and thus provide support for their value.

As for the Happé Strange Stories, there is almost no correlation between age and ability with this task. Again, it would be expected that across the reasonably wide age range in this study's participant group, improvements in ability would be seen with age but this was not found to be the case. Likewise, again there was virtually no correlation with nonverbal cognitive ability.

The only variable that did correlate significantly was pragmatic language skills. However, regression analysis indicated that, though the variable was successful at predicting who will fail the task (with over 85% predicted correctly), it was less successful at predicting who would pass (with only approximately one third predicted correctly). This resulted in the regression analysis not finding the PLCS to significantly predict whether a participant would pass or fail the task. It therefore seems that though a significant correlation was found, it is likely that other aspects of ability, not measured in the current study, are also important. There are studies that have demonstrated that executive functioning is important for performance in ToM tasks (Sodian & Hülken, 2005), and is commonly an area of difficulty for children with LD (Bishop & Norbury, 2005; Im-Bolter, Johnson & Pasqual-Leone, 2006). Future research should consider its role in ability with this task and other aspects of social cognition.

10.2.4 Hidden Emotion task (LD group)

In the Hidden Emotion task the results of correlation analysis are similar for the previous two tests of social cognition; age and nonverbal cognitive ability were found to have very low levels of correlation with whether a participant passed or failed this task. Again, age in particular would be expected to correlate significantly with ability here due to the reasonably wide age range and the research that has shown big advances are made in more complex aspects of emotion and emotional displays over this age (Harris 1998; Lewis 1993; Raikes & Thomson, 2005; Harter & Budin,

1989) as assessed in this task. Correlation levels were also low for the three CELF-4 composite scores, as was found for the Second Order ToM task. This indicates that, though it may seem that the information processing and linguistic demands are high, this is not the main reason for participants in the LD group failing the task.

As for the Second Order ToM task, pragmatic language was found to be the only variable that correlated significantly with task performance this time with a stronger correlation (at .50). However, again, though close to significant regression analysis did not find the PLCS reliably predicted whether a participant in the LD group would pass or fail this task. The measure was highly successful at predicting whether a participant would fail the task, (with a prediction rate at over 94%), but was less successful at predicting whether a participant would pass (with a prediction rate of only 44.4%). The lack of a significant association in regression analysis indicates that, as for the Second Order ToM task, other aspects of ability not investigated in the current study are also likely to be playing an important role.

10.2.5 Qualitative note re participant with ASD diagnosis

The participant with an ASD diagnosis in the LD group scored highly in all three social cognition assessments. His scores were more in keeping with the Control group, despite having LD. It seems unlikely that he would be “bootstrapping” ability in this task with good language skills in order to pass using a different method (as argued by Tager-Flusberg & Joseph 2005 and discussed in Chapter 3 (3.3), as his language skills were assessed as being considerably lower than the average range for this age. However this participant’s performance does highlight and support the point put forward by Tager-Flusberg & Joseph (2005) that these tasks do not bear much resemblance to social cognitive requirements in everyday social interactions. As this boy had an ASD diagnosis it can be assumed that, despite these good scores, social interaction is an area of considerable difficulty for him in his day to day life.

10.3 VARIABILITY IN PERFORMANCE AMONGST BOYS WITH LD

10.3.1 Research question and hypothesis

Part 2, Question 2.1.2: Is there evidence that boys with LD can do well with tests of social cognition despite their limited language skills?

Hypothesis 2.1.2: Due to the lack of previous research in this area, no hypothesis was put forward for this question

Finding: Though as a group the boys with LD scored lower in tests of social cognition there is considerable variation in ability within the group which does not seem to be related to the severity of the pupil's language difficulty. This finding will now be discussed more fully.

10.3.2 Performance of boys with LD

Some boys with LD were able to perform well in all three social cognition tasks even with very low CELF-4 CLS scores. No correlation was found between obtaining high scores in the Happé Strange Stories or passing the Second Order ToM or Hidden Emotion tasks and higher CELF-4 CLS scores. In other words, it seems to be possible to perform well with these social cognition tasks with very limited language skills. Conversely some of the participants with better language skills (i.e. scoring closer to the 10th percentile) performed very poorly in these tasks.

These participants are therefore demonstrating the reverse of the theory put forward by Tager-Flusberg & Joseph (2005) that people with autism and good language skills make use of these skills in order to “bootstrap” ability in these tasks. Rather than relying on good linguistic skills to work out the required response in these tasks, some of these participants were able to overcome very limited language skills and demonstrate good understanding of the mental states of the protagonists in the stories. It is perhaps the case that they are using good social cognitive understanding or social perceptual skills (Tager-Flusberg & Joseph, 2005) to “bootstrap” their limited language skills.

As Tager-Flusberg & Joseph (2005) point out however, these tasks bear little resemblance to everyday social interactions. It is of note that a high proportion of the boys with LD who passed the Second Order ToM task did so only when a follow up question was asked and they were able to revise their answer. Likewise the other two tasks also allow more processing time and chance for revisions than everyday interactions. It cannot therefore be said that they will necessarily have better functional social communication skills. Analysis into the relationship between

performance with these tasks, language skills and functional skills (i.e. ability to form and maintain friendships) was not carried out in this study. This is an area for future research.

10.4 GENERAL CONCLUSIONS FOR PART 2, QUESTION 1

The three assessments of social cognition were found to be most closely associated with different aspects of communication. This ties in with research that argues for a very close interaction between language (defined broadly to include the communicative as well as the representational aspects) and social cognition as discussed in Chapter 3 (3.2.2). However different tasks were found to correlate with different aspects of this broad definition of language. The Happé Strange Stories were found to be most closely associated with structural (or representational) language skills, particularly expressive language as measured by the CELF-4. The other two assessments were more closely associated with pragmatic language skills, which relate more to the communicative aspects of language. This can be taken to add strength to Astington & Baird's (2005) proposal, (see 3.2.2) that in debates about which aspect of language is more important for social cognitive skills, rather than being an either/ or argument, both aspects are central.

Alternatively the finding that the three social cognition tests are more closely associated with different aspects of communication skills could be taken as evidence that they are tapping different constructs. As discussed in Chapter 3 (3.1.2) social cognition is a broad concept which encompasses an increasingly broad range of abilities as we get older and social understanding becomes more flexible and elaborate (Nelson, 2005). Any assessment task can only tap into a small aspect of this and is therefore unavoidably a proxy for increasingly multi-faceted skills. In the current study, as well as tapping different aspects of communication skills it seems that the assessment tasks are tapping into other underlying processes. Correlations between the variables included in the current study and performance in the social cognition tests were lower than expected. This indicates that there is a lot of variability in test performance that is unaccounted for. Investigations into other aspects of ability, for example aspects of executive functioning would perhaps pick up stronger associations.

10.5 FRIENDSHIP SKILLS OF BOYS WITH LD

10.5.1 Research question and hypothesis

Part 2, Question 2.2: How are boys with LD rated for their ability to get on with their peers compared with a typically developing control group?

Hypothesis 2.2: It was predicted that the group with LD will be rated as having significantly more difficulties relating to their peers than the control group

Finding: Parent and teacher ratings indicated that the boys in the LD group had significantly more difficulty relating to their peers than boys in the Control group, and thus Hypothesis 2.2 was upheld. This finding will now be discussed more fully.

10.5.2 Friendship ratings of boys with LD and Control group

10.5.2.1 Comparison of parent and teacher scores

The mean scores for ability to get on with peers reported in the Results section (Table 7-20 and 7-21) are in keeping with the mean scores found in the UK standardisation of the SDQ (Goodman 2001) reported in the Table 5-1. Ratings of ability to get on with peers were similar for parent and teacher scores in both the LD and Control groups indicating that parents were just as likely as teachers to indicate that the child had difficulties in this area. This finding indicates that difficulties with friendship are not only being seen in one environment but are more pervasive than this.

However, the correlation between the parent and teacher ratings is at a moderate level (.45), indicating a relatively low level of agreement. Therefore it seems that though similar levels of difficulty within the groups were recorded, parents and teachers had quite different perspectives on the individual participants' abilities.

10.5.2.2 Comparison of LD and Control group scores

When taken as a group, both parents and teachers rated the boys with LD significantly higher (indicating more difficulties) than the boys in the Control group. This finding ties in with previous research in this area discussed in Chapter 3 (3.5) (e.g. Fujiki et al 1999; Asher & Gazelle 1999; Durkin & Conti-Ramsden 2007). It is

now well established that children with LD have difficulties forming and maintaining friendships. Also linking in with previous research (Durkin & Conti-Ramsden, 2007; Brinton & Fujiki 2002; Fujiki et al, 1999), there was evidence for considerable heterogeneity in ability within the LD group. In the current study ratings by both parents and teachers put about 50% of the boys with LD in the “*close to average*” or “*slightly raised*” bands indicating no significant difficulties. This proportion of about half or more functioning well in this area is again similar to previous studies (Durkin & Conti-Ramsden, 2007; Fujiki et al 1999). The question of particular interest in this section relates to the reasons *why* there is such variability and the discussion will now turn to this.

10.5.3 Research question and hypothesis

Research Question 2.2.1: Are receptive language skills most predictive of friendship rating (as found by Durkin & Conti-Ramsden, 2007)? Or are pragmatic language skills or social cognition more closely associated?

Hypothesis 2.2.1: It was predicted that a close association between receptive language skills and friendship rating would be found, but the association would be closer for pragmatic language skills and friendship rating. A close association between friendship rating and social cognition test performance was also predicted but due to the lack of research in this area it was not predicted whether this would be closer than for pragmatic language skills.

Finding: No significant correlations between parent rating of friendship and any of the variables investigated were found. For teacher rating significant correlations were only found between the tests of social cognition and friendship rating. There were no significant correlations between pragmatic or receptive language ability and either parent or teacher rating of friendship, thus Hypothesis 2.2.1 was not upheld.

10.5.4 Variability in friendship rating in the LD group

Unexpectedly low correlations were found between most of the variables investigated and rating of friendship, for both parents and teachers. Perhaps the least surprising finding was that nonverbal cognitive skills had almost no correlation with parent or teacher rating. This variable was included to investigate whether there

was an association with general learning difficulties and friendship skills rather than an association specifically between communication difficulties and friendship.

More surprising is the low correlation between any aspect of communication skill (expressive, receptive or pragmatic language skills) and friendship. As stated in the hypothesis, a close association was expected between receptive and pragmatic language skills and friendship rating. Of the three CELF-4 composite language measures, receptive language skills (measured by the CELF-4 RLI) did have the highest level of correlation with both parent and teacher friendship rating. However the level of correlation was still low at approximately .25 to .27 for both parents and teachers and did not reach significance.

Although not directly comparable, this finding does not support Conti-Ramsden & Durkin (2007) who identified an association between receptive language ability at age 7 years and friendship skills in adolescence (as discussed in Chapter 3, 3.5.1). It is important to acknowledge considerable differences in study design between their study and the current one, however. Firstly their study was a longitudinal investigation of predictors of friendship skills at a much later age, rather than an investigation of associated difficulties at the same age as in the current study. Secondly, their sample only included children who had been identified with SLI and were attending specialist educational provision to support their language skills. Therefore they were not in mainstream classes as in the current study. With the inclusion policy of the last decade or two and increasing numbers of pupils with significant additional support needs being included in mainstream classes, it may be that many of their participants presented similarly, however their experiences and opportunities for forming friendships will be quite different to the participants in the current study. Thirdly it is of note that their participants have what they term “a history of SLI” and therefore not all participants continued to present with significant difficulties with their structural language skills as they got older. In the current study all participants had current significant structural language difficulties.

In the current study it was possible to include a measure of pragmatic language skills, which was recognised by Durkin & Conti-Ramsden (2007) to be an omission in their study. It is unclear why there is very little correlation between this measure and either parent or teacher friendship rating. Though the majority of participants with LD had pragmatic language difficulties there was still a considerable range of scores in the CCC-2 PLCS in the group and it would be expected that this would

relate to ratings of friendship skills. This again indicates a need for fuller information about pragmatic language skills from more than one informant.

Of all the variables investigated, the only significant correlations with either parent or teacher rating of friendship were two of the assessments of social cognition (the Second Order ToM and the Hidden Emotion tasks). Moderate levels of correlation were found for both these variables and teacher rating of friendship, but there was little correlation between these variables and parent rating. Regression analysis following this up found that for both tasks there was a significant association between teacher rating of friendship and whether a participant with LD would pass or fail the task. This finding in part upholds Hypothesis 4 which proposed that a significant association between friendship rating and social cognition would be found.

In their discussion, Durkin & Conti-Ramsden (2007) consider whether there may be a general impact of language ability on social cognitive processing and that this could be through receptive language difficulties leading to difficulties tuning in to the others' verbally expressed needs, interests and expectations. The current study does provide support for social cognitive ability being linked with friendship ability amongst boys with LD but the analysis does not show a particular link with receptive language skills or indeed any aspect of communication skills within this group.

As reported earlier in this chapter (10.2), the third test of social cognition, the Happé Strange Stories, seemed to be tapping a different construct to the other two tasks, being linked more closely with structural language than pragmatic language skills. Further support for this task tapping a different construct is provided through the low correlation between ability with these stories and ratings of friendship.

It is not clear why there should be significant correlations between the two social cognition measures and teacher rating of ability to get on with peers and not parent rating. Perhaps this indicates that the teachers have a more realistic picture of the child's abilities in this area. It is true that they see the pupil amongst their peers daily and will have expert knowledge of typical development in this area. Alternatively, it is possible that parents have a more realistic picture because they see their child in a wider range of settings outside the (possibly stressful) school environment. A limited correlation between parent and teacher ratings of a child's abilities is recognised in

the literature (Bishop, 2003; Goodman, 2001). Future research should address the reasons for this lack of agreement.

10.5.5 Reasons for association between social cognition and friendship

As discussed in Chapter 3, it is known that there are considerable developments in emotional understanding through middle childhood. As children's understanding becomes more sophisticated through these years, they develop insight into the psychological states and motivations behind other peoples' behaviour (Harter & Budin, 1987, Raikes & Thompson, 2005, Carpendale & Lewis, 2006). This developing understanding has an impact on how a child relates and fits in with his peers and therefore has an impact on his attachment relationships (Raikes & Thompson, 2005). It makes sense that if a child has problems with emotion understanding then this will have an impact on his ability to make friends. The Hidden Emotion task requires the child to consider the emotions, motivations and perspectives of a character in relation to another child (or group of children). It may be that awareness of others' feelings, motivations and reactions (as measured in this task) is more pertinent to friendship than language skills, and as shown in the analysis for the section 10.5, though significantly more likely to be problematic amongst boys with LD, this is not directly linked with severity or type of LD.

It is perhaps more surprising that a close association was found between the Second Order ToM task and teacher rating of friendship. As raised in Chapter 3, it has been argued that this assessment does not measure any aspect of social cognition beyond what is investigated in the false belief task and the fact children pass this at a later age is due to the greater information processing and grammatical demands of the task (Sullivan et al 1994). Contrary to this argument, in the current sample of boys with LD, structural language skills were not found to be closely associated with ability in this task. Instead this task seems to relate closely with friendship skills, indicating that it is a reasonably good indicator of functional social skills.

The Happé Strange Stories are also designed to investigate the perspectives of others in social situations, but focus more on investigating non-literal comprehension of language through stories that include sarcasm, jokes, lies and figures of speech. As identified earlier in this chapter it seems that, of the variables investigated, ability with these stories is most closely associated with structural language ability, at least

amongst boys with LD. Together with the finding that performance with these stories was not associated with rating of friendship skills suggests that this assessment does not give an indication of functional social skills.

10.5.6 Value of assessments of social cognition

As discussed in Chapter 3 (3.1), language ability and social cognition are intertwined and it is difficult and perhaps counter-productive to try and separate the two as, in order to develop, both are dependent on each other (Dunn & Brophy, 2005; Nelson 2005). However, the results of this study indicate that it is possible to do this to some extent. The finding that boys with very poor language skills could “bootstrap” their very limited language abilities, presumably with good social understanding, and perform well with these tasks indicates that they require more than language skills in order to pass or score highly.

To recap the argument by Tager-Flusberg & Joseph (2005) (discussed in Chapter 3; 3.3) social cognition tasks investigate representational understanding of mind and involve reasoning about the content of mental states. Social perceptual skills relate more closely to functional skills in that they involve real time judgements about mental states based on information that is available in faces, voices or body gesture (Tager-Flusberg & Joseph 2005). It can therefore be argued that all three tasks require social cognitive skills, but not necessarily social perceptual skills and thus all three are appropriate measures of social cognition, if only aspects of it.

However should an assessment of social cognition be required to give an indicator of functional skills? The fact that two of the social cognition assessments (the Second Order ToM and the Hidden Emotion task) were found to be more closely associated with both pragmatic language skills and friendship (as rated by teachers) provides support for these being good indicators of functional social skills. Perhaps this should be a criterion for a useful assessment of social cognition. Researchers and clinicians should consider carefully what they are using these tests for and what they can be expected to give an indication of.

10.6 CHAPTER SUMMARY

This chapter has provided a discussion of the findings from Research Questions Part 2. The social cognitive abilities of boys with LD, in comparison with a typically developing control group were discussed with reference to previous research in this area. Levels of association and possible reasons and implication of these were then considered. The friendship skills of boys with LD in comparison with the Control group were discussed, again tying in with previous research. The strength of association between friendship, aspects of communication skills, social cognition and nonverbal cognitive ability were discussed, again relating to previous research. The chapter finished with a discussion of possible reasons for the associations found and the implication of these findings for future developments of tests of social cognition.

CHAPTER 11: SOCIAL COGNITION IN BOYS WITH EB

This chapter provides a discussion of the findings for Research Questions Part 3 for which the Integration Support Audit group was split into three sub-groups. The chapter starts by stating whether the hypotheses relating to the research questions in part 3 were upheld. There is then a discussion of the differences between these groups in the assessments of social cognition and pragmatic language skills, with comparisons to previous research.

11.1 SOCIAL COGNITION OF BOYS WITH EB

11.1.1 Research Question and hypothesis

Research question 3.1: How do boys with EB score in social cognition assessments compared with boys with LD (with or without EB) and a typically developing control group?

Research question 3.1.1: Is a poorer performance in tests of social cognition amongst boys with EB due to a high rate of LD?

Hypothesis 3.1: Participants with EB will score significantly lower in tests of social cognition than the Control group.

Hypothesis 3.1.1: Consideration of language skills will show that language ability is associated with a lower score in these assessments, rather than EB.

Findings: The results of this study uphold hypotheses 3.1 and 3.1.1. As a group, participants with EB scored significantly lower than the boys in the Control group in the tests of social cognition. Closer investigations revealed that this was due to the high proportion of participants with LD in the EB group and it was the presence of LD that was associated with social cognition score, not EB. These results will now be discussed in more detail.

11.1.2 Performance in tests of social cognition: general overview

As stated, the EB group scored significantly lower than the Control group in all three tests of social cognition. When the Integration Support Audit group was broken into

subgroups (those with LD and no EB (LD-Only), those with EB and LD (LD&EB) and those with EB and no LD (EB-Only) this was found to be due to the boys with LD having difficulty with the tasks, and not connected with EB. The performance of these sub-groups in each of the social cognition tasks will now be discussed in turn.

11.1.2.1 Happé Strange Stories

The presence of EB seemed to make no difference to the mental state scores obtained in the Happé Strange Stories. Both of the groups with LD (LD&EB and LD-Only) scored similarly, as did the two groups without LD (EB-Only and Control). Therefore rather than a lower mental state score being associated with EB it was found to be associated only with LD. The association between these tasks and LD is not a straightforward one. The result from Chapter 7 (7.4), discussed in Chapter 10 (10.3) indicated that some participants with LD were able to score highly in this task, regardless of their poor language skills. This indicates that the severity of their LD does not relate directly to their mental state score.

Comparison with previous research

As discussed in Chapter 3, (3.6) there is limited previous research that has used the Happé Strange Stories with children with EB in this age range. The study by Happé et al (1996), found that children with a diagnosis of conduct disorder performed more poorly in these stories than a typically developing control group. Happé proposed that this provided some evidence for children with conduct disorder having difficulty with social cognition. The findings of the current study indicate that it is more likely that differences in group performance were due to the language limitations of participants in the conduct disorder group. This supports the proposal that we need to fully assess the language skills of participants with EB when investigating ability with social cognition tasks, as it is likely to be associated with low scores rather than EB.

Analysis by individual stories

Analysis into performance in the individual Happé stories showed that the EB group did score significantly lower than the Control group for a proportion of these: *White Lie (New Hat)*, *Misunderstanding (Burglar)*, *Contrary Emotions (Painting)* and *Figure of Speech (Cough)*. Badenes (2000) found that their group of children with EB had specific difficulty with the *White Lie* story, when compared with their typically developing peers (as reported in Chapter 3; 3.6.1). The current study does not

support such a specific association. Though the EB group did score significantly lower than the Control group in this story, there were other stories that the group also had difficulty with. The current study can therefore only provide partial support to their “theory of nasty minds”, in which they proposed that children with EB have a particular difficulty understanding the social expectations of lying to spare someone else’s feelings; other aspects of social understanding were also found to be problematic.

11.1.2.2 Second Order ToM and Hidden Emotion tasks

The findings for the Second Order ToM and Hidden Emotion tasks are similar to those for the Happé Strange Stories. That is, in both tasks significantly more participants in the EB group failed the task than in the Control group. However, analysis of ability with these tasks in the 3 sub-groups demonstrates that this is influenced by the high number of boys with LD in the EB group. In both tasks a significant difference in the proportions passing these tasks was only found when participants with LD (LD-Only and LD& EB group) were compared to those without LD (EB-Only and Control group). The participants in the EB-Only group scored similarly to the Control group. In fact, interestingly, in both tasks there was a slight trend towards a higher proportion passing in the EB-Only group than the Control group. This finding indicates that having LD increases the likelihood of difficulties with this task. However, as for the Happé Strange Stories, (analysis in 7.4, discussed in 10.3) this does not seem to be a straightforward link between LD and ability with these tasks. Performance is not related to the severity of language difficulties. In other words, a more severe difficulty with language does not translate to a higher likelihood of failing the task.

11.1.2.3 Comparisons with previous research: Second Order ToM task

Charman et al’s (2001) study (discussed in Chapter 3, 3.4) investigated the ability of children with ADHD in ToM tasks including the Second Order ToM task, and found no difference in their performance when compared with a typically developing control group. This remains a surprising result when we consider the findings of the current study. The high level of association between ADHD and LD has been discussed in this thesis (see Chapter 2, 2.5.1.2). It would therefore be expected that, as suggested in Chapter 3, (3.4), a higher proportion of this group would fail this

task due to many of the participants having LD. It may be that the language abilities of Charman et al's (2001) sample were within the average range, however without assessment information about these it is not possible to say whether or not this is the case. This highlights the need to consider and fully assess the language ability of participants with EB when investigating their ability with social cognition assessments in order to identify the reasons for any difficulties with the task, and conversely the reasons for no difficulty when this is perhaps expected.

11.1.2.4 Comparison with previous research: Hidden Emotion task

This is the first study to have used the Scale of ToM with a group of children with EB, limiting the comparisons that can be made with previous research. The Hidden Emotion task relies on understanding of emotional display (Wellman & Lui, 2004) and it is interesting that 100% of the EB-Only group passed this task. Rather than indicating that these pupils have a lack of emotional understanding as is sometimes suggested (e.g. Cooke, Greenberg & Kusche, 1994; Denham et al 2002; Hay et al 2004) this indicates perhaps an acute understanding of these kinds of emotional situations. This is perhaps unexpected considering the low pragmatic language scores that have been identified across all the participants with EB.

11.1.3 Links with pragmatic language skills

Investigations into the social cognition of boys with EB were carried out as it was expected that there would be a high level of pragmatic language difficulties in this group, and possible reasons for this were sought. As reported in this thesis (analysis in Chapter 6, 6.3 and discussed in Chapter 9, 9.2) highly significant pragmatic language difficulties were indeed found in the EB group. However, the results discussed above indicate that difficulty with social cognition tasks is not associated with EB. This study's findings therefore do not support an argument for limited social cognition underlying the observed pragmatic language difficulties of boys with EB as put forward in Chapters 1 and 2.

The findings regarding the pragmatic language skills of the EB group were surprising as, unexpectedly, language ability did not seem to make any difference to how the EB group were rated for pragmatic language ability by their teachers (as discussed in Chapter 9, 9.2). This finding prompted analysis of the pragmatic language skills in the third sub-group, those with LD only (and no EB) to investigate

whether pragmatic language difficulties are less severe or prevalent amongst this group. However, it was found that though there was a slight trend towards this group scoring more highly in the PLCS (indicating better pragmatic language skills), their score was considerably lower than the Control group and not significantly different from either of the groups with EB. It therefore seems that it is quite possible to have poor pragmatic language skills and no significant EB (as the LD-Only group demonstrates). However it is important to note that there was missing CCC-2 data for two participants in this group, giving a total of only 6 participants for this analysis. This very small number calls for caution when interpreting this result and further research with larger sample sizes is required.

There is therefore no evidence for the pragmatic language difficulties seen in the group with EB (without LD) being associated with poorer social cognition. In fact those with EB-only seemed to have at least as astute awareness in these tasks as in the Control group. Although these participants with EB did well in these tests this is not reflected by their teacher ratings of pragmatic language skills. Perhaps this shows that these social cognition tests are limited in what they tell us about functional social communication skills at least for this group. This does not mean that these pupils do not have difficulties with their social perceptual skills (Tager-Flusberg & Joseph, 2005), and their functional social abilities for reasons over and above a lack of practice or lack of willingness. Alternatively perhaps this indicates limitations in our assessment of pragmatic language.

11.2 CHAPTER SUMMARY

This chapter has provided a discussion of the performance of the three Integration Support Audit Sub-groups in the social cognition tasks and pragmatic language assessments. Ability with the social cognition tasks seem to be linked with the presence of LD and not EB. Pragmatic language skills are rated as poor across all Integration Support Audit groups and is not specifically associated with EB or LD.

CHAPTER 12: EVALUATION OF STUDY METHODOLOGY

This chapter will provide a discussion of the study's methodological design. It will start with a discussion of the participant selection method and the advantages and limitations of this. This will include a discussion regarding the matching criteria, decisions made regarding exclusion and inclusion criteria and consideration of the study's sample size. Following this there will be a discussion of the limitations of the assessment instruments used.

12.1 PARTICIPANT SELECTION METHOD

12.1.1 Use of the Integration Support Audit

As discussed in Chapter 1, the intention of the current study was to include a community sample of boys who had similar presenting difficulties in the areas of language and behaviour rather than selecting participants through their educational placement or diagnoses. The Integration Support Audit allowed us to do this successfully. A large proportion of the boys on the Support Audit presented with levels of LD and/ or EB that met with the inclusion criteria for the current study, with only 5 out of the 48 boys originally recruited excluded from the final analysis. This highlights how widespread these types of difficulties are amongst children with additional support needs.

This method also made it possible to recruit a group of boys within mainstream classes. With educational policy increasingly supporting inclusive education rather than providing specialist classes or schools for children with LD or EB, this results in many children with significant difficulties in these areas being educated in mainstream provision. Therefore the sample in the current study is representative of pupils that mainstream educational staff and speech and language therapists regularly work with.

As raised in Chapter 1, and discussed through Chapter 2 there is now a wide literature that has identified that LD is more prevalent in areas of low SES (e.g. Tizard & Hughes, 1984; Locke et al, 2002; Hart & Risley, 1995, 1999). It was therefore considered important to have a representative sample of children with LD

across the socio-economic groups. Through the use of the Integration Support Audit and contacting schools systematically, as they were listed (alphabetically), this avoided targeting any one particular SES group. As reported in the results section there was a high proportion of participants in the bottom three SIMD decile ranks. Our sample therefore reflects the high representation of LD in areas of social disadvantage.

Including all boys on the Integration Support Audit (excluding the ones identified with Complex Needs) and assessing their level of LD and EB for inclusion in the analysis allowed a representative sample of boys in mainstream settings with LD and/ or EB. This would not have been possible if participants were recruited by diagnosis or specialist educational provision. An alternative recruitment method would perhaps have been through caseloads of speech and language therapists (SLTs) working in mainstream schools. However, as reported in Chapter 6 (6.2.2), only approximately a quarter of the EB group were receiving input from SLT, though over 50% were reported by parents to have had difficulties with language /communication identified. The method employed acknowledges that many children with these types of presenting difficulties are not receiving the specialist support of SLT, particularly as at this age and in lower SES groups they may have been discharged due to prioritisation of services or failure to attend appointments (Cooper, 1998; Elton & Harvie, 2004). Recruiting through SLT caseloads would therefore have been missed many suitable participants. Furthermore, the study required a representative sample of boys with additional support needs in both EB and/ or LD, rather than boys primarily identified with LD, as would be the case when recruiting through SLT caseloads.

With regard to selecting boys with EB, the use of the Integration Support Audit again allowed for a representative sample of boys across a range of SES groups rather than focusing on socially disadvantaged areas. Furthermore, as stated the study required a representative sample of boys with LD and/ or EB, rather than boys primarily identified with EB. This method avoided the same issue identified with recruitment through SLT caseloads, though in this case the issues would arise through recruiting boys from the caseloads of professionals working with children with EB.

12.1.1.1 Identification of participants with LD

It is of note that only one boy out of the 48 was reported by his parents to have received a diagnosis of SLI, however he was one of the 5 boys who were excluded from the final analysis as his language skills were found to be within the normal range. This highlights one of the problems using diagnostic labels to recruit participants and then treating the resulting group as homogeneous. As discussed throughout this thesis, this has been an issue with many previous studies of children identified with SLI (e.g. Farmer 2000, Gillott et al, 2004; Farrant et al 2006) and is therefore one that was avoided in the current study. Beyond having a similar level of difficulty with language, the group with LD was recognised to have a heterogeneous pattern of presenting difficulties and the analysis allowed for us to consider the contribution of this.

12.1.1.2 Identifying participants with EB

The method for selecting pupils with EB also allowed for the selection of participants with similar presenting difficulties, rather than their diagnostic label. Again, as discussed in Chapter 1 (and as for LD) diagnostic labels can include pupils with a wide range of presentations and co-existing difficulties. It is recognised that this will also apply to the current study but the analysis allowed us to consider the impact of such co-occurring difficulties rather than treating participants as a homogeneous group.

12.1.1.3 Decision to include pupils with ASD reported by their parents

It was not expected that parents would report an ASD diagnosis when the school had not. However, as reported in the Results (6.1), this was the case for two participants. One of these boys had LD (and EB) and the other presented with EB only. The decision to include them was made for the reasons stated in 6.1, however it was expected that they would be seen as outliers in some of the analysis. In particular this was expected for the social cognition tasks and the CCC-2 sub-scales for pragmatic language and social interaction (Social Relationships and Interests). This was not found to be the case. It should be noted that for both these boys their reported diagnosis was ASD, rather than autism. The advances in our understanding of ASD in recent years were discussed in Chapter 1, and linking in with this these boys' presenting difficulties are likely to be less severe than those seen in autism. This would tie in with the school seeming to be unaware that they had received a diagnosis. Though based on only two participants, the finding that

they are not outliers in any aspect of pragmatic language or social cognition assessment indicates that there is no clear division between them and those with LD. This finding gives some support to the proposal by Bishop & Norbury (2002) of blurred boundaries between LD and ASD.

12.1.2 Matching the Control group

A Control group of typically developing boys matched for age and SES was required in the current study to ensure that differences in performance were not due to the participants in the Integration Support Audit group being of a lower SES or different ages. As reported in the Results (6.1), groups were successfully matched by these criteria. This has allowed for the Integration Support Audit groups to be compared with a representative sample of boys from a similar background and reduces the possibility that differences seen between groups are due to SES.

12.1.2.1 Exclusions from the Control group

There were 5 boys excluded from the Control group. This revealed a limitation in the Support Audit as a method for recruiting participants. It was expected that boys who were not receiving this support would not have difficulties with either LD or EB to the degree of the boys in the Support Audit group; however this was not necessarily the case. This supports the discussion throughout this thesis of the lack of clarity between “impaired” and the general population and the issues around the classification of difficulties.

When gathering the data it became clear that the Integration Support Audit was used flexibly. There were pupils who were not listed on the Integration Support Audit who were actually receiving additional support in class in the same way as pupils who were. Likewise there were pupils listed who had reduced support from what they had been allocated. Schools seemed to use the additional support hours allocated to respond to the pupils’ needs at particular times, tying in with the discussion regarding the social construction of EB in Chapter 2 (2.1.3.4). A pupil may present with difficulties in a certain setting and/ or time but this is the result of a particular dynamic or set up, rather than being issues residing in the pupil (Pomerantz, 2005; Tobbell & Lawthorn, 2005). However, the majority of pupils on the Support Audit were receiving the support allocated and through the information

received from parents in combination with teachers, their difficulties were clearly long term and existing in more than one setting.

It was surprising that in the Control group there were 3 boys with LD who did not have EB and did not seem to have their difficulties recognised. It would be of value to investigate further the profiles of children with LD who seem to be coping well in the mainstream class setting. Their scores in the CELF-4 indicated that they should be having difficulties with language to the level of boys in the LD group. What makes these boys different in their ability to engage with school socially and academically is unclear. Again a larger participant group would be required before any conclusions could be drawn plus wider investigations into their functioning in the classroom and therefore no analysis was carried out for these participants in the current study.

The remaining 2 boys who were excluded from the Control group had EB (one with co-existing LD). These externalising difficulties are more immediately obvious (Cross, 2004) and it is harder to see how they could have been unidentified (as is possible for LD). It is not clear why the school did not identify them as receiving support or about to be put forward for the Support Audit as was one of the exclusion criteria provided to the school for participant recruitment.

These 5 participants were excluded from the analysis because a Control group of typically developing boys was required particularly for Research Questions Part 2 and 3. This was also required for the Research Questions Part 1; however it did also cause a limitation in the study design for this question. When investigating the levels of association between the different aspects of child ability and EB it is of note that boys with LD (and no EB) had been excluded from the Control group. Their inclusion would have weakened the level of association between EB and LD to some extent. Nevertheless there is still an argument for a high level of co-existence between LD and EB, as this relates to only 2 participants out of 44 (4.5%) and the impact of their inclusion would have been very small.

12.1.3 Recruitment – a representative sample?

A particular effort was made to recruit “hard to reach” families in this study due to the recognised link between LD, EB and social disadvantage (discussed in Chapter 2) and the desire to have as fully representative a sample of pupils with these presenting difficulties as possible. Parents were contacted by phone and were

offered a home visit or a meeting at their child's school or other location of their choosing in order to discuss the project, rather than relying on them reading the information and posting back the consent form. For consistency of approach, this method was used with all families, following up the posted written information. However it was found that particularly in disadvantaged areas some parents did not answer their phone, the number provided by the school was no longer valid or parents did not give consent. It is possible therefore that the study has still not picked up a representative sample of participants with these types of difficulties in the lowest SES groups. It may be that these families would present differently from the ones who did agree to participate.

The researcher met with parents in order to fill out the forms. This provided support for parents with low literacy levels as it gave the opportunity to offer to read through questionnaires together with the parent. Through the data collection process it was clear that the literacy levels of some parents were low and it was necessary to read the questions for parents to fill out the responses. This method therefore aided the response rate of a wider range of families.

12.1.4 Sample size for the analysis

The number of participants it would be possible to recruit for was perhaps over-estimated due to the length of time required to collect complete data for each participant. Two assessment times with each child as well as meeting with their parent for approximately 45 minutes amounted to approximately 3 hours per child including travelling time. The amount of telephone calls required was also found to be time consuming. As a result the sample size, though acceptable for most of the analysis carried out in this study, and comparable to good, relative to many studies of children with LD (e.g. Brinton et al 1998; Fujiki et al 1999; Farmer 2000; Gillott et al, 2004; Farrant et al 2006), is small for multiple regression analysis. It was therefore not possible to compare all of the 6 variables included within one multiple regression model when investigating the strength of association with EB (Research Questions Part 1).

The recruitment method also made it difficult to predict the numbers that would be included in each sub-group of the Support Audit group (LD-Only, LD&EB and EB-Only). By far the majority had combined LD and EB with very small numbers with

either LD only or EB only. This resulted in the LD-Only and EB-Only subgroups being very small, and caution is required in the interpretation of results with the group broken down to this level.

12.2 ASSESSMENT: LIMITATIONS AND ISSUES

In the main the assessment tools selected for use in the current study were found to be appropriate for the study's purposes. A couple of issues arose with two of the assessments, the PSI and the CCC-2 which will now be discussed.

12.2.1 Parenting Stress Index (PSI)

The PSI was selected as it was the most appropriate measure to gather information about parenting stress relating to the parent–child relationship, however there were couple of limitations with this assessment. Firstly, as mentioned in 12.1.3, there were some difficulties due to the literacy levels of some of the parents participating in the study. As a result for some parents the questions were read out while the parent completed the checklist. As some of the questions are quite personal, it is possible that this may have affected the way that the parents responded, providing answers that down played any actual concerns or difficulties, even though it was stressed that the forms were anonymous.

Secondly, even for those who completed the forms unaided, the wording of the PSI was quite difficult for some parents and many requested clarification. In part, difficulties were due to the test being from the USA and there were some aspects of the grammar and scenarios that were unfamiliar. Some of the items required help from the researcher about how best to interpret and answer them. In particular the questions relating to the *Spouse* sub-domain caused some difficulties with interpretation. The format of the questions seemed to assume that parents were together and no guidance was given in the assessment procedures about how to respond if this was not the case. A number of parents in the current study found this section difficult to answer as they had not been with the child's father (or mother) for a considerable length of time, if at all. When parents asked for clarification on how to respond to the questions the researcher advised that they should consider how they feel about the support they are getting from the child's other parent now, when compared to what they expected when they had the child. For these and other

questions the guidance given by the researcher was consistent for all participating parents.

12.2.2 Children's Communication Checklist (CCC-2)

The decision to gather CCC-2 information from teachers only is a limitation of the study, as has been raised throughout the Discussion section. As Bishop (2003) states, the information from the checklist is of most value when completed by more than one respondent, allowing for information about ability in different settings to be combined. Parents are likely to have much more opportunity than professionals to observe their child in a wide range of different contexts. However, Bishop also states that readability statistics indicate that the CCC-2 can be completed by someone who has a reading level of 12 years or older (Bishop, 2003, p12). Thus in the current study it was decided against seeking responses from parents, partly as it was expected that a considerable proportion would have a reading age below this and also because parents already were being requested to complete three other questionnaires taking a total of 30 to 45 minutes to complete. It would have been too much to have this assessment in addition.

This results in queries regarding how much we can depend on the teacher's perspective only for ratings of communication skills. The finding that teachers rated the majority of pupils with EB as poor in all aspects of communication skills, regardless of their score in the CELF-4 is possibly due to these pupils having functionally poor communication skills in the school setting. However, it should also be borne in mind that teachers may have been overly negative about these pupils and that the teacher's responses are not a fair reflection of the child's abilities, even within the classroom setting. An improvement in the study design would be to investigate fuller information about pragmatic language skills across a range of settings. However the issue of the reading age required to complete the CCC-2 form and the concern regarding the number of checklists parents were required to complete remains. Without an alternative assessment tool that is practical for research purposes it is difficult to see how to resolve this.

12.3 CHAPTER SUMMARY

This chapter has provided information about the positives and negatives of the study design. Two areas have been discussed: the participant recruitment method and the assessment instrumentation.

CHAPTER 13: IMPLICATIONS FOR PRACTICE, FUTURE RESEARCH AND CONCLUDING COMMENTS

In this chapter there will be a discussion of the implications of the findings for practice. This will in part consider the findings from research question parts 1, 2 and 3 separately as well as looking at the conclusions which can be drawn overall. This will be followed by a discussion of possible directions for future research with some concluding comments.

13.1 IMPLICATIONS FOR PRACTICE

13.1.1 Need for more collaborative working between services

The findings of this thesis demonstrate a close and specific association between LD and EB, and an even closer association between pragmatic language difficulties and EB. Together this indicates a very high level of association between communication difficulties and EB, confirming previous studies that have proposed a strong and specific link (e.g. Baker & Cantwell 1987; Redmond & Rice 1998; Conti-Ramsden & Botting 2004; Beitchman et al. 1996, 2001, Brownlie et al. 2004; Lindsay & Dockrell 2000), even when other closely associated variables are considered. This does not exclude the likelihood that environmental factors are playing an important role in the development of difficulties in both areas. Following a biopsychosocial model, it is most likely that a range of factors will all be influencing each other in the development of difficulties and these will have an impact to different extents for different individuals.

In current practice children tend to be identified either with primary LD or primary EB (Garrett & Law, 2004), when in reality, as this study has demonstrated, they very often have complex co-existing difficulties in both areas. Children are subsequently are referred to the SLT services or CAMHS services. Though it is not uncommon for children to be referred to both services, current provision in most parts of the country is not “joined up” between the two to allow for both services to be part of the same team. Therefore though there may be some liaison, close collaborative working in the design and delivery of intervention rarely happens in practice (Garrett & Law, 2004, Clegg & Hartshorne, 2004).

Though limited, in the United Kingdom SLT is part of the CAMHS team in some areas and there are accounts of how the service can make a significant positive impact on interventions for children with combined LD and EB (Clegg & Hartshorne, 2004, Cross, 2005; Stringer, 2006). Studies such as these have shown that SLT can play a role in the following areas:

- Providing input into the assessment of a child's difficulties, for example identifying whether a child has receptive language difficulties which have not previously been identified, or contributing to the diagnosis of ASD
- Providing advice to other professionals about the appropriate language level of talking therapies and information that is provided to the child in order for the child to be able to fully understand, participate and therefore gain maximum benefit from these
- Providing direct intervention in order to develop the child's communication skills

13.1.1.1 Implications for social skills interventions

As stated in Chapter 2, it has been recognised for some time that children with EB often have difficulties with their social relationships. It is not uncommon for them to be referred to social skills programmes as part of a treatment plan (e.g. Webster-Stratton & Reid 2003; Webster-Stratton 2006). These programmes often have a social cognitive basis and emphasise social problem solving through activities designed to improve awareness of others' points of view and the ability to find mutually beneficial solutions to conflict and misunderstandings (Zaheh, Im-Bolter & Cohen, 2007). Though research has shown that these programmes are beneficial for reducing EB (Lochman & Wells, 2004) they are heavily dependent on language skills. Children need to be able to understand the scenarios, what others say and to be able to express themselves in order to both participate in and benefit from these programmes and adequate language skills are necessary for this (Zadeh et al 2007).

When we consider that a large proportion of these children with EB also have significant LD, this has implications for the extent that they can benefit from interventions such as those above that do not take account of this in their design. For example the extent the child's level of understanding of verbal language is

considered in the development of intervention activities, or the extent that a child's lack of response may be due to verbal expressive language difficulties rather than behavioural issues may not be fully considered. SLT can provide specialist knowledge about how we can scaffold and support their ability to access such interventions, as well as working on developing underlying communication/ language skills. Again this provides an argument for SLT being an integral part of child mental health teams.

Recognition of these difficulties with social relationships as pragmatic language issues and therefore an issue with communication rather than behaviour also has implications for intervention. These children may benefit from a more focused approach on pragmatic language skills than is currently the norm for children with EB. Advances in our understanding of ASD and pragmatic language skills have resulted in considerable developments in our ability to assess and provide intervention for difficulties in these areas over the past decade or so, notably through the work of Cathy Adams (e.g. Adams, 2001; Adams, 2005; Adams, Baxendale, Lloyd & Aldred, 2005; Adams, Lloyd, Aldred & Baxendale, 2006). Though not designed specifically for children with EB it may be that these children would also benefit from this approach.

13.1.2 Consideration of environmental factors – service delivery

The study also highlights the high number of boys with these combined difficulties that are from low SES backgrounds and have mothers with low levels of education and higher levels of parenting stress. As raised in the Chapter 1 (1.1), current Government policy aims to reduce health inequalities, including mental health. Due to the long term negative outcomes into adulthood for many of these children as discussed in Chapter 2, (2.5.2) these children should be a priority for intervention that aims to reduce these inequalities. The finding that communication skills seem to be strongly related with EB (even when other closely related factors are also considered) highlights an important role for SLT.

However it is notable that only a small proportion of the participants with EB in this study were receiving input from SLT. In some instances families seemed frustrated at the lack of support from services. It may be of course that they were not engaging with services as expected, for example failure to attend appointments may have

resulted in their being discharged from the service. Rather than expecting these families to fit with a service model that is unsuitable for their needs, it is surely a more effective use of resources to adapt the service to better meet the needs of the community it serves. Descriptions of such changes to SLT service delivery have been provided (Cooper, 1998; Elton & Harvie, 2004; David & Hackshall 2006) and include more flexible appointment systems, increased involvement of parents and increased collaborative working with other services also working with the families. Again this highlights the importance of SLT being integral to child mental health and behaviour teams.

Interventions to reduce health inequalities are currently running and being developed in areas of low SES. Probably the most prominent targeting children is Sure Start (or The Early Years Framework in Scotland). One of the main focuses of Sure Start is the provision of support for parents in order to improve their engagement with their children in a way that encourages language, literacy and cognitive development and also strengthens their children's' emotional wellbeing and behaviour (Department for Children, Schools and Families, 2010). Due to the high number of boys with LD and EB in areas of low SES in the current study, this highlights the need for this.

Due to strong evidence indicating early intervention is the most effective (Meisels & Shonkoff, 2000), the main focus of Sure Start is on the preschool years, with much less emphasis placed on the school age child. The results of the current study show that at 8 to 11 years the issue of the link between low maternal education, and high levels of LD and EB are still of concern. In one sense this gives support for government initiatives such as Sure Start. A continued focus in the preschool years should have repercussions for older children as in the current study. However there is an argument too for a focus on this older age group. Parents of participants reported concerns relating to the transition to secondary school, and that their child's difficulties may be on-going into adolescence and adulthood. Furthermore there were concerns about their child as they reached this older age group and were becoming physically bigger and therefore more difficult to manage. These reports indicate a need for fuller investigations into the support needs of the parents of children of this age group.

13.1.3 Social Cognition and EB

The finding that boys with EB only have difficulty with tests of social cognition when they have co-existing LD has implications for other studies that investigate social cognitive abilities in this group. This study demonstrates that, due to the high level of co-existence between LD and EB, it is important that language skills are fully assessed as it is likely that they will have an impact on task performance. As well as social cognition tasks, this is applicable to other areas such as a child's response to language based interventions. The findings highlight the importance of assessing the language skills of boys with EB in order to consider the extent LD could be limiting their performance rather than assuming it is to do with their EB.

13.1.4 Social cognition and LD

The findings provide evidence that boys with LD have problems with social cognition tasks when compared with a typically developing control group, but this does not relate directly to their severity of LD. Previous researchers have queried whether difficulties with these tasks reflect ability with functional social understanding (Farmer 2000, Gillott et al, 2004). The results of this study indicate that two of the social cognition tests (Hidden Emotion and Second Order ToM) to some extent do provide an indication of functional ability, as they related to teacher rating of friendship. However the third assessment (the Happé Strange Stories) showed no such association. This highlights the need for careful consideration about what we are using these tests for and what we expect them to provide an indication of. Due to the multifaceted nature of social cognition, particularly at this age group, each test can only be a proxy of ability.

13.1.5 Friendship skills of boys with LD

As discussed throughout this thesis friendship plays an important role both for the development of social interaction skills and for emotional wellbeing. Research into the reasons for difficulty in this area is therefore high priority as this information can be used to inform intervention that supports pupils with difficulties in this area. There is currently interest in using peers to help support the social participation of pupils with LD, EB and other additional support needs (e.g. Newton et al 1996). In order to develop the effectiveness of this approach we need to have a better understanding of the presentations of children with difficulties in this area. This study provides a small step towards our growing knowledge. It has shown that though boys with LD

are more likely to have difficulty with friendships this does not seem to be directly linked with their type or severity of LD. Within this group there does seem to be a link between performance in social cognition tasks and rating of friendship skills. We need to continue to investigate the underlying reasons for difficulties with friendship amongst boys with LD as this information will help us train and support peers and targeted pupils in these interventions.

13.2 AREAS FOR FUTURE RESEARCH

The current study has raised a number of areas for future research that have been touched on throughout this thesis.

Firstly there is a need to consider the long term outcomes of this participant group. Other studies investigating the link between LD and EB (or SEBD more broadly) have commented on their lack of consideration of environmental factors (e.g. Snowling et al 2006). No other study has gathered information about environment and the child's abilities as in the current study. It would be of value to follow up the group as they entered adolescence and adulthood to identify which ones have persisting difficulties and which have difficulties that resolve.

As raised in Chapter 8 (9.3.2), it is recognised that reading comprehension puts considerable demands on pragmatic language skills such as non-literal understanding, use of context and ability to make inferences. However, the impact of difficulties with the pragmatic aspects of reading in the development of EB is not known, and further research should consider this.

The finding that there seemed to be no difference in the pragmatic language skills of boys with EB and LD and those with EB but not LD, was not expected. Future research should gather more in-depth information about pragmatic language skills from more than one respondent in order to confirm whether these boys do indeed present very similarly as this finding suggests. Linked with this is a need to consider the functional communication skills of the boys with EB (with or without LD). The finding that boys with EB and no LD were scored as low as boys with LD in their structural language skills is surprising and needs to be further investigated.

Limitations in our assessments of social cognition have been identified in this study and future research should address these. Notable is the lack of normative data for these tasks. The only study which has attempted to gather normative data for any of the tasks used was carried out by O'Hare et al (2009) who sought to gather normative information about the Happé Strange Stories. However, the mean scores for typically developing children found by O'Hare et al (2009) were different to those in the current study. This highlights the need to gather normative data with larger samples than has been done to date. This would help us identify developmental progressions of responses amongst typically developing children, in order to have a better understanding of what can be considered deviations from this. Furthermore, as low levels of correlation were found between the performance in these tasks and most of the variables investigated, it is important that other aspects of ability and their association with performance are investigated. For example, executive functioning is recognised to be important for these tasks (Hughes et al 1998; Charman et al 2001) and further research should consider its role.

An important area for future research relates to intervention. The current study confirms the close link between communication difficulties and EB, over and above other associated variables. Earlier in this chapter (13.1.1) it was proposed that there should therefore be closer collaborative working between SLT and CAMHS services. Though there has been some research that has indicated the important role SLT can play within CAMHS (Clegg & Hartshorne, 2004, Stringer 2006) there is a need to build on this with further research. The demonstration of effective collaborative working between services will strengthen the case that this service provision should be standard rather than unusual as is currently the case.

13.3 CONCLUDING COMMENTS

This thesis has sought to develop our understanding of the links between EB and LD and has been composed of three main parts. Firstly it has investigated associations between EB and a range of environmental factors and aspects of child ability. This has been in order to determine whether, when other factors that are also recognised to be associated with EB are accounted for, the strength of association between LD and EB is as strong as previous studies have indicated. The findings

identified that the link between LD and EB is indeed specific and strong. Though word decoding and nonverbal cognitive skills were associated with EB, this was found to be at a weaker level than verbal language skills. Likewise consideration of environmental factors that are known to be linked with EB (parenting stress, maternal education and adults at home) showed that, again, though significantly linked, the level of association was not as strong as that between EB and LD. Only one factor was found to have a stronger level of association than LD and that was pragmatic language skills, adding to an increasing body of research identifying a high level of pragmatic language difficulties amongst boys with EB.

There is therefore a strong argument for a close and specific link between communication difficulties and EB, but it is not claimed that this is a causal pathway in either direction. The use of biopsychosocial models of the development of EB and LD help us to recognise that interactions between a range of environmental, psychological and biological factors will all play an important role to different extents for different individuals. Following this model, however, it remains unclear why so many boys will have predispositions towards both LD and EB occurring together as the study's findings suggest. It is also unclear why there is such a high level of pragmatic language difficulties in this group.

The study aimed to provide some clarity into the reasons for this high level of pragmatic language difficulty, through investigating whether they were associated with an underlying deficit in social cognition. It was evident from previous research that many of the boys with EB would most likely have co-existing LD and information about the social cognitive skills of children with LD was therefore sought. However, research in this area was found to be inconclusive, with a clear need for further research. This resulted in parts 2 and 3 of the study. Part 2 has focused on boys with LD, with the information feeding into Part 3.

In Part 2 it was confirmed that boys with LD had significant difficulty with social cognition tasks compared with a typically developing control group. This provided some support for language and social cognitive development being dependent on each other. However, closer investigations into the reasons for variability within the group's performance indicated that different tests of social cognition seemed to be more closely associated with different aspects of ability, suggesting that different tests are tapping different constructs. Furthermore, there was evidence that though having LD put a child at risk of having difficulties with these tasks, this did not seem

to relate directly to the severity of LD. Some boys with very limited language skills performed well with these tasks indicating that they were using abilities other than language to help “bootstrap” their performance.

Investigations into whether social cognitive limitations were associated with functional social skills in this group involved consideration of whether task performance was linked with friendship rating and/ or language skills (particularly receptive language skills). Unexpectedly low correlations between friendship and aspects of communication were found. A significant association was found between teacher rating of friendship and performance in two of the social cognition tasks indicating that these two tasks do give an indication of functional skills.

In Part 3, boys with EB were also found to have significant difficulty with the social cognition tasks, however further analysis indicated that this was due to the high proportion of boys with LD within this group, and difficulty could be attributed to LD rather than EB. Boys with EB and no LD performed as well, if not slightly better than those in the Control group. Therefore though boys with EB have pragmatic language difficulties these do not seem to be linked with social cognitive limitations. These findings highlight the need to consider the high incidence of LD amongst boys with EB when considering reasons for difficulties with tasks such as these.

The close and specific association between communication difficulties and EB has implications for service delivery. Due to the long term negative outcomes for these children services need to consider how to adapt and develop in order to more successfully meet their needs. At present services for communication difficulties and SEBD are quite separate from each other. The needs of these children would be better met with close collaborative team working for assessment and intervention design and delivery. Future research should aim to demonstrate how SLT can enhance the effectiveness of CAMHS interventions, in order to develop the evidence base and help secure the financial backing required for SLT being a standard part of the CAMHS team. Research into service development should also recognise that a high proportion of children with these complex coexisting difficulties are from socially disadvantaged backgrounds with parents with low levels of education and higher levels of parenting stress. Services should consider how to meet these families’ needs more effectively than at present.

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Code:

Date:

APPENDIX I

Happé Strange Stories

Administration

Introduce the task by explaining: "I am going to read some stories to you and then ask you some questions about the stories." I want you to listen carefully and then answer the questions at the end of each story."

Administer all stories in the order presented below.

Read each story once through at normal reading speed and ask the questions listed.

The child had the story read out to them. The story was illustrated with a cartoon and the story was laid in front of the child whilst the examiner read it out.

Rules for Repetition:

A maximum of 2 readings is allowed and you may read the **whole** story once more if:

- a) The child asks for repetition or
- b) The child answers 'I don't know' to question 1

If the child answers question 1 incorrectly, continue to question 2 **without** repetition.

Record the child's answers verbatim in the space provided at the end of each story.

Positive encouragement can be given but no direct feedback on the correctness of the answer is permitted. Refer to the scoring guidelines at the end of testing.

SS1: Dentist

John hates going to the dentist because every time he goes to the dentist he needs a filling, and that hurts a lot. But John knows that when he has toothache, his mother always takes him to the dentist. Now John has bad toothache at the moment, but when his mother notices he is looking ill and asks him "Do you have toothache, John?". John says "No, Mummy".

- 1 Is it true what John says to his mother? YES/NO*
- 2 Why does John say this?

SS1: P / F

Justification type:

Code:

Date:

APPENDIX I

SS2: New Hat

One day Aunt Jane came to visit Peter. Now Peter loves his aunt very much, but today she is wearing a new hat; a new hat which Peter thinks is very ugly indeed. Peter thinks his aunt looks silly in it, and much nicer in her old hat. But when Aunt Jane asks Peter, "How do you like my new hat?" Peter says, "Oh, it's very nice".

- 1 Was it true what Peter said? YES/NO*
- 2 Why did he say it?

SS2: P / F

Justification type:

SS3: Burglar

A burglar who has just robbed a shop is making his getaway. As he is running home, a policeman on his beat sees him drop his glove. He doesn't know the man is a burglar, he just wants to tell him he dropped his glove. But when the policeman shouts out to the burglar, "Hey you, Stop!", the burglar turns round, sees the policeman and gives himself up. He puts his hands up and admits that he did the break-in at the local shop.

- 1 Was the policeman surprised by what the burglar did? YES/NO*
- 2 Why did the burglar do this, when the policeman just wanted to give him back his glove?

SS3: P / F

Justification type:

Code:

Date:

APPENDIX I

SS4: Picnic

Sarah and Tom are going on a picnic. It is Tom's idea, he says it is going to be a lovely sunny day for a picnic. But just as they are unpacking the food, it starts to rain and soon they are both soaked to the skin. Sarah is cross. She says "Oh yes, a lovely day for a picnic alright!"

- 1 Is it true what Sarah says? YES/NO*
- 2 Why does she say this?

SS4: P / F

Justification type:

SS5: Painting competition

Jane and Sarah are best friends. They both enter the same painting competition. Now, Jane wanted to win this competition very much indeed, but when the results were announced it was her best friend Sarah who won the prize, not her. Jane was very sad that she had not won but happy for her friend, who got the prize. Jane said to Sarah, "I'm so happy you won!". Jane said to her mother, "I am sad I did not win that competition!"

- 1 Is it true what Jane said to Sarah? YES/NO*
- 2 Is it true what Jane said to her mother? YES?NO*
- 3 Why does Jane say she feels happy and sad at the same time?

SS5: P / F

Justification type:

Code:

Date:

APPENDIX I

SS6: Banana

Katie and Emma are playing in the house. Emma picks up a banana from the fruit bowl and holds it up to her ear. She says to Katie "Look! This banana is a telephone!"

- 1 Is it true what Emma says? YES/NO*
- 2 Why does Emma say this?

SS6: P / F

Justification type:

SS7: Haircut

Daniel and Ian see Mrs Thompson coming out of the hairdressers one day. She looks a bit funny because the hairdresser has cut her hair much too short. Daniel says to Ian, "She must have been in a fight with a lawnmower!"

- 1 Is it true what Daniel says? YES/NO*
- 2 Why does he say this?

SS7: P / F

Justification type:

Code:

Date:

APPENDIX I

SS8: Cough

Emma has a cough. All through lunch she coughs and coughs and coughs. Father says "Poor Emma, you must have a frog in your throat!"

- 1 Is it true what Father says to Emma? YES/NO*
- 2 Why does he say that?

SS8: P / F

Justification type:

SS9: Santa

On Christmas Eve, Alice's mother takes her to the big department store in town. They go to look in the toy department. In the toy department Mr Brown, Alice's next door neighbour, is dressed up as Santa Claus, giving out sweets to all the children. Alice thinks she recognises Mr Brown, so she runs up to him and asks "Who are you?" Mr Brown answers "I'm Santa Claus!".

- 1 Is it true what Mr Brown says? YES/NO*
- 2 Why does he say this?

SS9: P / F

Justification type:

Code:

Date:

APPENDIX I

SS10: Doll

Yvonne is playing in the garden with her doll. She leaves her doll in the garden when her mother calls her in for lunch. While they are having lunch, it starts to rain. Yvonne's mother asks Yvonne "Did you leave your doll in the garden?" Yvonne says "No, I brought her in with me, Mummy".

1 Is it true what Yvonne says? YES/NO*

2 Why does Yvonne say this?

SS10:

P / F

Justification type:

Code:

Date:

APPENDIX II

Scale of Theory of Mind: Script and Record Form – Order A

Note: repeat story if do not pass memory questions

A) Diverse desire			
<p>Here is Ryan. It is his snack time. So Ryan wants a snack to eat. Here are 2 different snacks: a carrot (point) and a biscuit (point).</p> <p>Which snack would you like best? Would you like a carrot (point) or a biscuit (point) best?</p> <p>Well that's a good choice, BUT... Ryan REALLY likes <other snack> best. He doesn't like <child's choice>. What he really likes best are <other snack>.</p> <p>So, now it is time to eat. Ryan can only choose one snack, just one. Which snack will Ryan (point to Ryan) choose? a carrot or a biscuit?</p>			
	Which snack would you like best?	carrot biscuit	
	Which snack would Ryan like best?	carrot biscuit	
		P / F	
B) diverse belief			
<p>Here's Emma. Emma wants to find her cat. Her cat might be hiding in the bushes (point) or.... It might be hiding in the garage (point).</p> <p>Where do you think the cat is? In the bushes or... in the garage?</p> <p>Well, that's a good idea, BUT ...Emma THINKS her cat is in the <other location> (don't point) So where will Emma (point to Emma) look for her cat?. In the bushes or In the garage?</p>			
	Where do YOU think the cat is?	Bushes garage	
	Where will Emma look for her cat?	Bushes garage	
		P / F	
C) knowledge access			
<p>Here's a box. What do you think is in the box?</p> <p>Let's see.... It's really a snake inside!</p> <p>Okay, what's in the box? _____</p> <p>Emma has never ever seen inside this box. Now here comes Emma.</p> <p>So, does Emma KNOW what is in the box. Has Emma looked inside the box?</p>			

Code:

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APPENDIX II

Preview questions:	What do you think is inside the box?		
Post-view question:	what is inside the box?		
Target question	Does (name) know what is in the box?	Yes	no
Memory check	Has (name) looked inside this box?	Yes	no
		P / F	

D) false belief (contents)

Here is a plaster box. What do you think is in this box?

Let's see..... it's really **a spider** inside!

Okay.... What is in the box? (if child makes an error here, show contents inside again until child gets this question correct)

Ryan has **never ever seen** inside this plaster box. Now here comes Ryan.

So.... What does Ryan **THINK** is in the box? Plasters or a spider?

Did Ryan **see** inside this box?

	What do you think is inside the plaster box?		
	What is inside the plaster box?		
Target question	What will (name) think is inside the box?	Plasters	spider
Memory question	Did (name) see inside the box?	Yes	no
		P / F	

E) Hidden Emotion (laughing)

Now, I'm going to tell you a story about a boy called Matt. In this story, Matt might feel happy, he might feel sad, or he might feel not happy or sad, but just OK.

Pre-view: Can you point to the face that is : _____ sad _____ OK _____ happy

After I'm finished the story, I'm going to ask you about how Matt **really feels inside AND** how he **looks on his face**. How he really feels inside might be the **same** as how he looks on his face or it might be **different**.

Matt's friends were playing together and telling jokes. One boy told a mean joke about Matt and everyone laughed. They all thought it was funny. Matt did **not** laugh. He did **not** think it was funny. Matt didn't want everyone to see how he **really felt** about the joke. So Matt tries to hide how he feels.

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APPENDIX II

Comp question	What did the other children do when the boy told a mean joke about Matt?		
Comp question	Did Matt think that the joke was funny?		
Target - Feel question	How did Matt really feel when the other children were laughing?	happy ok sad	
Explanation	Why did Matt feel _____ ?		
Target – Look question	How did Matt try and look on his face when everyone laughed?	happy ok sad	
Explanation	Why did he try to look _____ ?		
	Difference in emotion	P / F	
	Justification score		
Total passes:	A	B	C
			D
			E

Notes/ Comments:

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Date:

APPENDIX II

Scale of Theory of Mind: Ryan and Emma

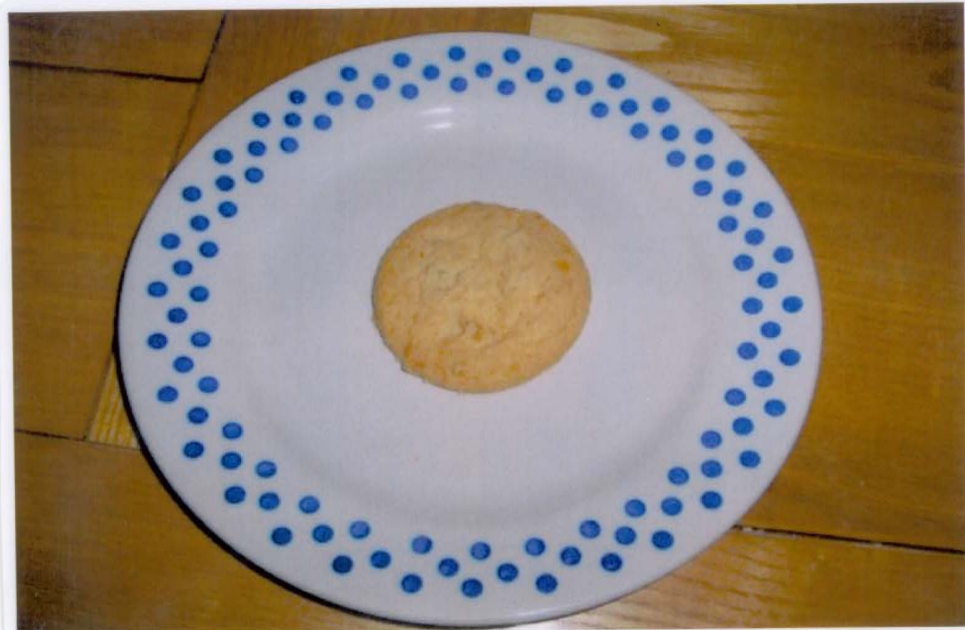
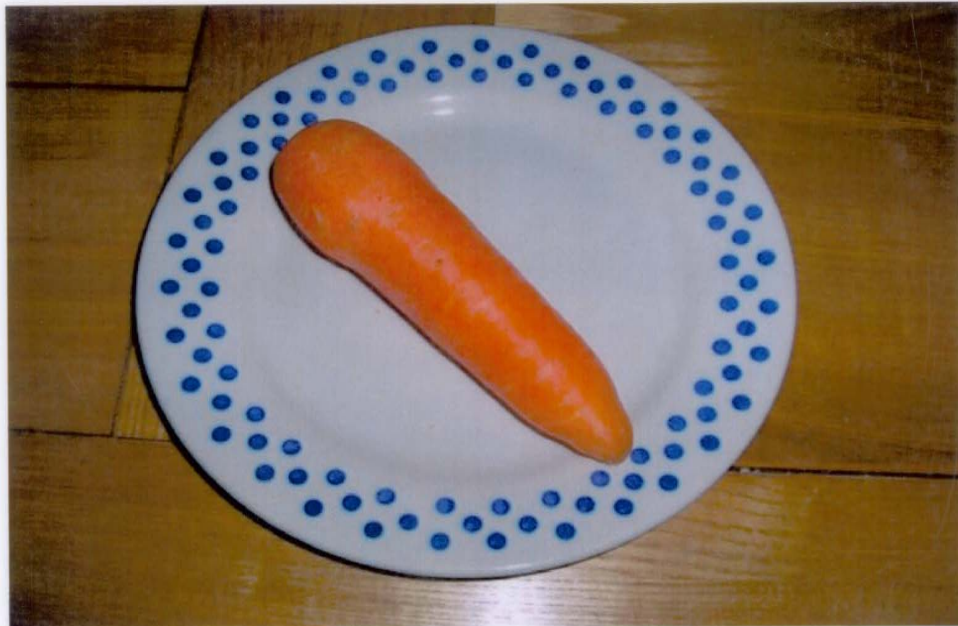


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Date:

APPENDIX II

Scale of Theory of Mind: Diverse Desire



Code:

Date:

APPENDIX II

Scale of Theory of Mind: Diverse Belief

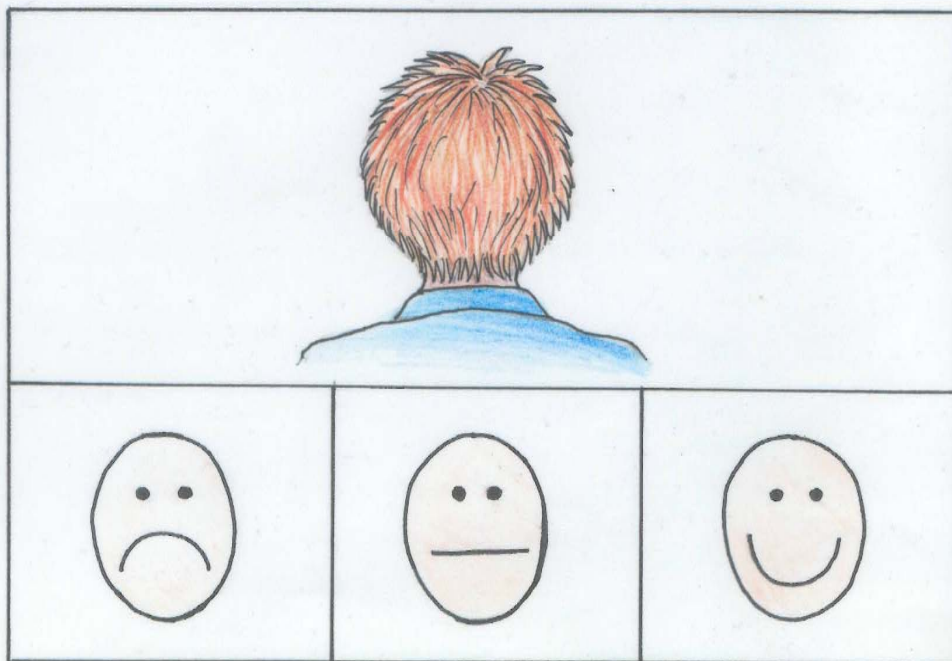
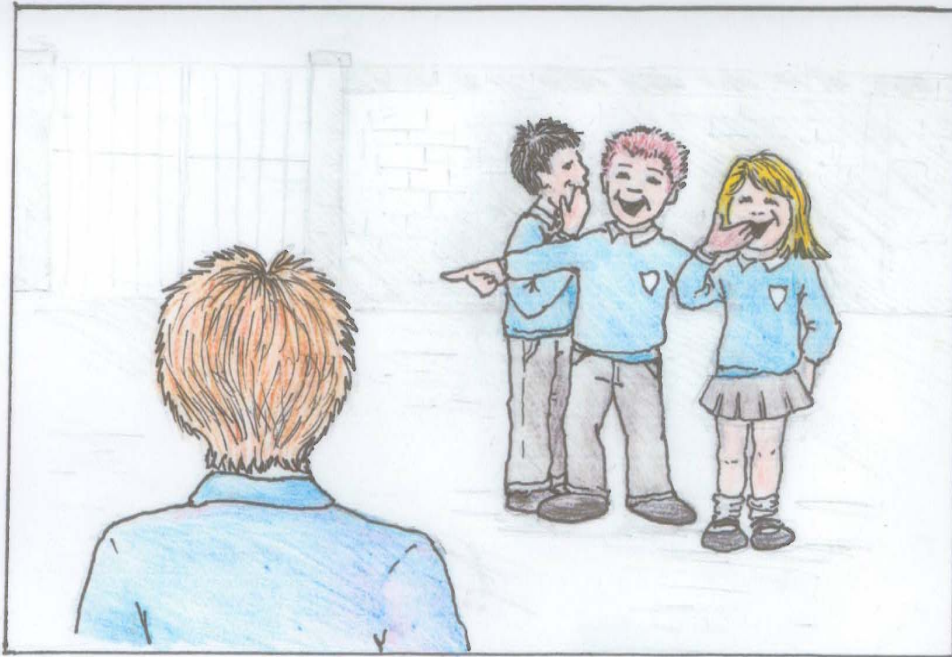


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Date:

APPENDIX II

Scale of Theory of Mind: Hidden Emotion



APPENDIX III

Code:

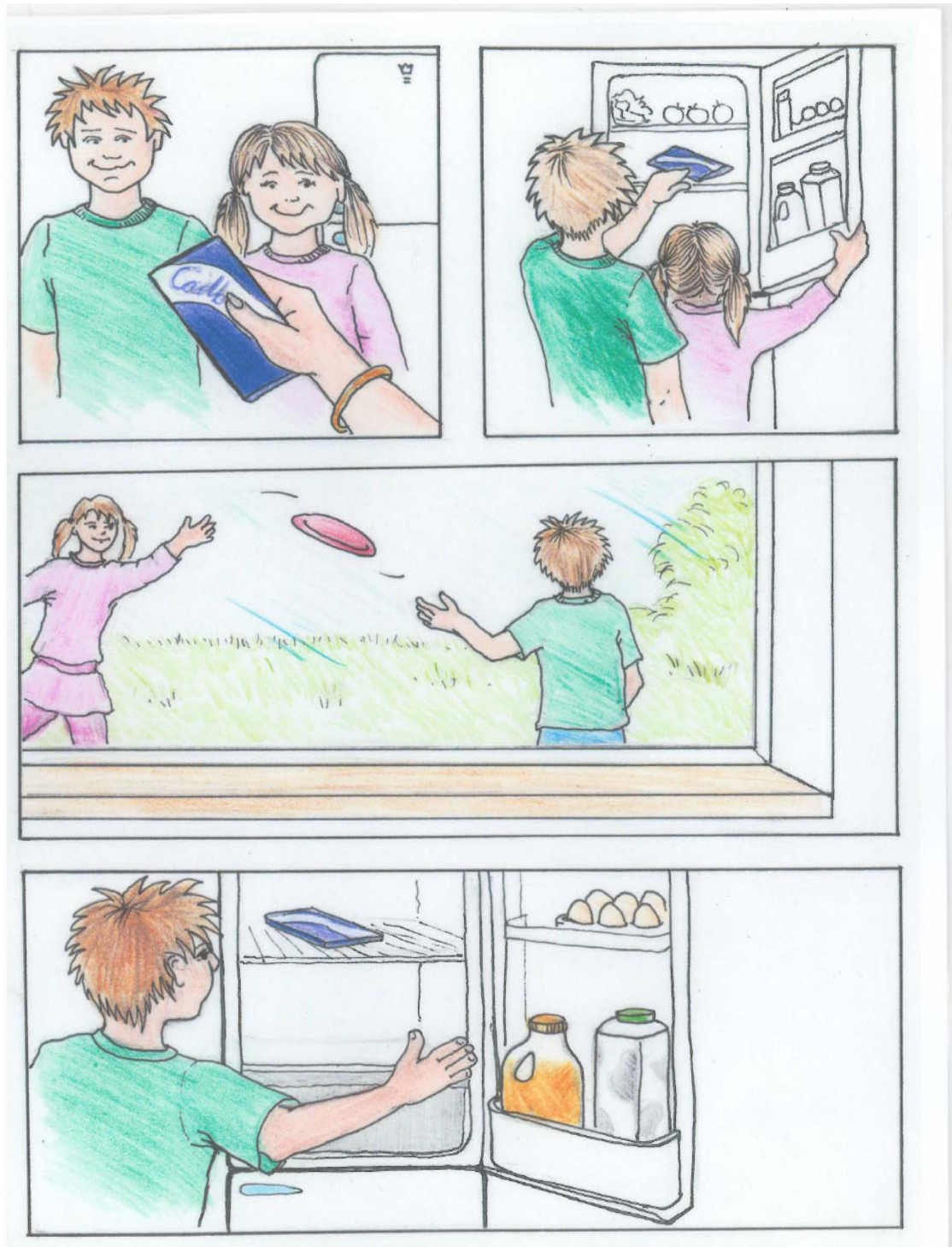
Date:

Second order Theory of Mind– Script and Record form

G) 2nd Order - Chocolate story			
(from Hughes et al 2000) Journal child psychology and psychiatry 41			
"I am going to read you a story and ask you questions about it. Listen carefully..... "			
Granny gives Emma and Ryan some chocolate to share. She says "go and put the chocolate in the fridge. You can have some when mum says so."			
Emma and Ryan go and put the chocolate in the fridge. Then they go outside to play.			
A little later, Ryan comes in for a glass of juice. He goes to the fridge and sees the chocolate. He wants the chocolate all to himself so he takes the chocolate out of the fridge and puts it in his bag .			
Oh Look, Emma is at the window. She can see everything that Ryan is doing! She sees him put the chocolate in his bag. Ryan is so busy hiding the chocolate he doesn't see that Emma is watching him.			
Comp question	Where was the chocolate first of all?		
Linguistic control question	Where did Emma see Ryan put the chocolate?		
Comp question	Did Ryan see Emma at the window?		
Later on, mum calls Ryan and Emma to the kitchen. She says they can have some chocolate. She asks Emma to get the chocolate.			
ToM question	Where does Ryan think Emma will look for the chocolate?	Fridge bag DK	
ToM Justification	Why does Ryan think that?		
Justification type			
Comp question	Where is the chocolate really ?	Fridge bag DK	
Comp question	Where was the chocolate first of all?	Fridge bag DK	
Comprehension score (if answer all comp questions correctly)			P / F
ToM score			P / F
Linguistic control Question			P / F

Notes/ Comments:

Second Order Theory of Mind (Chocolate Story)







Date: 2009

Language skills & emotional wellbeing in primary school boys

Dear Head Teacher

Request for permission to carry out research with pupil(s) at your school

I am carrying out a study investigating the emotional wellbeing of boys with language difficulties as described in the enclosed information sheet. As part of this study I need to carry out assessments with boys in primary schools.

Does the study have official approval?

The City of Edinburgh Council have given permission to undertake the research in primary schools in Edinburgh. The study also has ethical approval from Queen Margaret University.

Which pupils would it involve?

The City of Edinburgh Council, Children and Families Department have given the research team access to the Integration Support Audit to identify potential participants. Together with Barbara Reid, Support Coordinator, we have identified that **XXXXXXXXXXXXXXXXXX** attend your school and may be suitable participants. We are keen to discuss the suitability of these pupils and also whether there may be other boys in the school who are appropriate. We are excluding boys with a diagnosis of autism or who have English as an additional language. We also need to identify boys who are a similar age to participants to be in a control group.

With your consent to carry out assessments at your school, we would then contact parents to see if they are happy for their children to take part.

What would the school be requested to provide?

We would require a quiet(ish!) space in the school to carry out the assessments one to one with each child.

What would the pupils have to do?

Each child will take part in an assessment of verbal language skills social perspective taking, reading ability and non-verbal skills and will be asked a few questions about home. This will take place over two 45 minute sessions. Assessments will be carried out by an experienced speech and language therapist.

What would teachers have to do?

Each participating child's teacher, or someone at school who knows him well, will be asked to fill out 3 short questionnaires about the child's behaviour, communication and friendship skills and support in school. This will take approximately 20 minutes.

What happens next?

I will phone in the next week or so to see if you have any questions about the study and are happy for the assessments to take place. Following this I will send out an information sheet and consent form to parents. Once parental consent has been obtained I will be in touch to arrange a time to carry out the assessments at school and to identify boys for the control group.

If you wish to contact me for further information about the project before this, you can do so by email at lmackie@gmu.ac.uk or telephone on 0131 474 0000, ask for Leila Mackie.

In the event of a complaint, please contact Professor James Law, Director, CIHR on 0131 474 0000.

Yours sincerely

Leila Mackie

Research Speech and Language Therapist
Centre for Integrated Healthcare Research
Queen Margaret University
Queen Margaret University Drive
Musselburgh, East Lothian
EH21 6UU



Language skills & emotional wellbeing in primary school boys

Information Sheet

Who is organising and funding the research?

The research project is funded by the Centre for Integrated Healthcare Research (CIHR), based at Queen Margaret University.

What is the research about?

It is recognised in the research literature that children with language difficulties (i.e. difficulties understanding verbal language and/ or talking) are at high risk of having co-existing emotional and behavioural difficulties with estimates of a 50 to 70 % co-occurrence rate. Furthermore, research indicates that children with emotional and behavioural difficulties often have language difficulties that have not been identified. There is evidence that these children who have co-existing difficulties at school are more likely to have long term psychosocial difficulties into adulthood. Research with this group of children, to understand which children are most at risk and the kinds of difficulties they have, is therefore high priority in order to help us design more effective supports and intervention.

Research with children with language impairments has shown that a child is more likely to have emotional and behavioural difficulties if he has literacy difficulties or if his language difficulties lie in understanding language as well as talking and/ or with social communication skills. However we do not know much about how aspects of the parent and child's relationship and the family environment may be contributing to emotional and behavioural difficulties in combination with the above. We will therefore be meeting with parents to discuss their concerns, their wellbeing, their view of their child and their family set up.

We also want to investigate the ability to understand and respond appropriately to social situations, often referred to as *social cognition*. In order to investigate this, each participating child will be asked to take part in a short activity looking at his or her ability to see things from "someone else's shoes".

The findings of this project will be important for helping us identify which children are most likely to need input from speech and language and other specialist services and the kinds of support that will be most useful for these children, their families and schools to help them participate fully socially and with school activities.

What will happen to the results of the research study?

The results of the research study will be presented at a research conference and may be presented at a professional interest group or research meeting. They may also be published in an academic journal. No child or school will be identifiable in any report or publication. Families that take part can ask for a summary of their child's assessment results. They can also decide whether they would like the school to receive a copy.

Feedback of the study's findings to schools

With parental consent schools will be sent a summary of the assessment findings for each child that participates. I would also be happy to do a presentation about the study and its findings to teaching staff and /or send a summary to schools if requested.

Contact Information:

Leila Mackie
Centre for Integrated Healthcare Research
Research Speech and Language Therapist
Queen Margaret University,
Queen Margaret University Drive,
Musselburgh,
East Lothian,
EH21 6UU

Tel: 0131 474 0000 (ask for Leila Mackie)

Email: lmackie@qmu.ac.uk



Language skills and emotional wellbeing in primary school aged boys

Date: xxth XXXXXXXX

Dear Parent

XXXXXXXXXXXXX, Head Teacher at XXXXXXXXXXXXXXXX Primary School has consented to our contacting parents of pupils at the school. We would like your child, xxxxxxxxxxxxxx to take part in a research study. Your child has been selected because he is listed on the Integration Support Audit that is held by the City of Edinburgh Council, Children and Families Department as having additional support needs and therefore receives support to help him participate at school.

What is the research about?

Research studies show that children who have difficulties with their talking and /or understanding verbal language (language difficulties) are more likely to find it difficult to make friends and participate fully in school. However, this is not the case for all children with language difficulties; some do quite well. We still do not know enough about why some struggle in these areas and others do much better. This study aims to increase our understanding by looking at aspects of development in boys with and without language difficulties to see how they relate to emotional wellbeing and ability to participate fully in school.

We want to include boys in this study who get extra support in school whether or not they have language difficulties. Your child may not have been identified with language difficulties but as he gets additional support we would like to include him in the study.

The findings of this project will be important for helping us identify which children and families are most likely to need input from speech and language therapy and other specialist services and the areas that may be most useful to focus support with these children, their families and schools to help children participate fully socially and with school work.

Does the study have official approval?

The City of Edinburgh Council have given permission to undertake the research in primary schools in Edinburgh. The study also has ethical approval from Queen Margaret University.

What happens if I agree to take part?

If you are happy for you and your child to take part, please complete and return the enclosed consent form. However, I will contact you by telephone in the next few days to allow you to ask any questions you may have. If you are happy to go ahead I will arrange to time to meet with you either at your home or your child's school to go through three questionnaires about your family, your child's strengths and difficulties and your own wellbeing as a parent. This will take approximately 45 minutes.

I will also arrange with your child's school to carry out an assessment of his talking and understanding, reading, social perspective taking and other skills. This will take place over 2 sessions of about 45 minutes.

Your child's teacher will be asked to complete a couple of short questionnaires about your child's strengths and difficulties and his ability to communicate and mix with others at school.

It is up to you whether or not you would like your child to take part. If you agree to take part you and your child are still free to withdraw from the study at any time, without giving a reason. This will not affect the services you receive.

What will happen to the results of the research study?

All the assessment results will be made anonymous and kept confidential. The results of the research study may be presented at a research conference and may be presented at a professional interest group or research meeting. They may also be published in an academic journal. No child will be identifiable in any report or publication. You will be able to choose if you would like information about your child's assessment results to be sent to you and/ or your child's school and speech and language therapist if he has one.

What happens now?

Thank you for taking the time to read this information sheet. Please feel free to discuss it with family and friends. I will contact you by phone in the next few days, however if you would like to contact me before this please call **0131 474 0000** and

APPENDIX V

ask for **Leila Mackie**. If I am unavailable you can leave a message and I will get back to you to answer your questions.

In the event of a complaint please contact Professor James Law, Director, Centre for Integrated Healthcare Research, Queen Margaret University on 0131 474 0000.

Yours sincerely

Leila Mackie
Research Speech and Language Therapist



Consent form

Language skills and emotional wellbeing in primary school boys

Dear Parent/Carer

Please read the information below and initial the appropriate boxes:

I have read and understood the information sheet and I have had an opportunity to ask questions about my child's participation

☐

I understand that I have the right to withdraw my child from this study at any stage without giving any reason. This will not affect the services I receive.

☐

I consent to my child taking part in this research study.

☐

Child's Name: _____ Date of Birth: _____

Your Name: _____ Your signature: _____

Day time contact number: _____

Signature of researcher: _____

Further options:

I would like you to send me information about my child's assessment results.

☐

I would like you to send this information to my child's school

☐

I would like you to send this information to my child's Speech and Language Therapist

☐

APPENDIX V

(if your child has one)

Name of speech and language therapist: _____

Many thanks!

(Please post this form to Leila Mackie in the envelope provided (**you do not need a stamp**), or if it is easier for you please hand it in to your child's school)

Leila Mackie

Research speech and language therapist

Code:

Date:

APPENDIX VI



Language skills & emotional wellbeing in primary school boys

Date: XXXXX 2009

Dear Parent

xxxxxxxxx, Head Teacher at xxxxxxxxxxxx Primary School has consented to our contacting parents of pupils in the school. We would like your child, xxxxxxxxxxxx to take part in a research study. We wish to assess and compare boys in 3 groups:

Group A: A group of boys who receive additional support in school as they have language difficulties (i.e. with their understanding verbal language and/ or talking)

Group B: A group of boys who receive additional support in school but do not have language difficulties

Group C: A group of boys who **do not** receive additional support in school

We would like to include your child as part of Group C.

What is the research about?

Research studies show that children who have difficulties with their talking and/ or understanding verbal language (language difficulties) are more likely to find it difficult to make friends and participate fully in school than other children. However, this is not the case for all children with language difficulties; some do quite well. We still do not know enough about why some struggle in these areas and others do much better. This study aims to increase our understanding by looking at aspects of development in boys with and without language difficulties to see how they relate to their emotional wellbeing and ability to participate fully in school.

The findings of this project will be important for helping us identify which children and families are most likely to need input from speech and language therapy and other specialist services and the areas that may be most useful to focus support with these children, their families and schools to help children participate fully socially and with school work.

Code:

Date:

APPENDIX VI

Does the study have official approval?

The City of Edinburgh Council have given permission to undertake the research in primary schools in Edinburgh. The study also has ethical approval from Queen Margaret University.

What happens if I agree to take part?

If you are happy for you and your child to take part please complete and return the enclosed consent form. However, I will contact you by telephone in the next few days to allow you to ask any questions you may have. If you are happy to go ahead I will arrange to time to meet with you either at your home or your child's school to go through three questionnaires about your family, your child's strengths and difficulties and your own wellbeing as a parent. This will take approximately 45 minutes.

I will then arrange suitable times with your child's school to carry out assessment of talking and understanding, reading, social perspective taking and non-verbal ability. The assessments will be carried out over 2 sessions of about 45 minutes.

Your child's teacher will be asked to complete a couple of short questionnaires about your child's strengths and difficulties and his ability to communicate and mix with others at school.

It is up to you whether or not you would like your child to take part. If you agree to take part you and your child are still free to withdraw from the study at any time, without giving a reason. This will not affect the services you receive.

What will happen to the results of the research study?

All the assessment results will be made anonymous and kept confidential. The results of the research study may be presented at a research conference and may be presented at a professional interest group or research meeting. They may also be published in an academic journal. No child will be identifiable in any report or publication. You will be able to choose if you would like information about your child's assessment results to be sent to you and/ or your child's school and speech and language therapist if he has one.

What happens now?

Thank you for taking the time to read this information sheet. Please feel free to discuss it with family and friends. I will contact you by phone in the next few days, however if you would like to contact me before this please call **0131 474 0000** and

Code:

Date:

APPENDIX VI

ask for **Leila Mackie**. If I am unavailable you can leave a message and I will get back to you to answer your questions.

In the event of a complaint please contact Professor James Law, Director, Centre for Integrated Healthcare Research, Queen Margaret University on 0131 474 0000.

Yours sincerely

Leila Mackie
Research Speech and Language Therapist
Centre for Integrated Healthcare Research,
Queen Margaret University
Musselburgh,
East Lothian, EH21 6UU

Code:

Date:

APPENDIX VII



Pupil checklist

I am happy to help Leila with her project.

☐

Session 1

We will be working together for about 45 minutes today. Here are the things that we will be doing. We can tick each one when we are finished.

Task	
1) Stories with questions	<input type="checkbox"/>
2) Reading	<input type="checkbox"/>
3) Listening to instructions	<input type="checkbox"/>
4) Listening and talking	<input type="checkbox"/>
5) More stories with questions	<input type="checkbox"/>
 Finished for today !! Well Done!! 	



Code:

Date:

APPENDIX VII

Session 2

We will be working together for about 45 minutes today. Here are the things that we will be doing. We can tick each box when we are finished.

Task	
6) Making up sentences	<input type="checkbox"/>
7) Story with questions	<input type="checkbox"/>
8) Thinking about words	<input type="checkbox"/>
10) Making designs	<input type="checkbox"/>
<div> Finished!! Well Done!! </div>	



Language skills and emotional wellbeing in primary school boys

Summary of Assessment

Name: XXXXXXXX Date of Birth: XXXXXXXXX
 Date of Assessment: XXXXXXXXXXXXXXXXX

Assessment	Score	Comments
Clinical evaluation of Language Fundamentals (CELF-4) (This is composed of a number of subtests and assesses understanding of verbal language and talking skills). A subtest score between 7 and 13 is within the average range for age.	Subtests: Concepts & Following Directions: 4 Recalling Sentences: 6 Formulated Sentences: 5 Word Classes - Receptive: 7 Word Classes - Expressive: 7 Overall Percentile Ranks: Core Language: 4 Receptive Language: 5 Expressive Language: 5 Percentile Rank: 47	XXXXX scored below the average range for most subtests. He did score within the average range for "Word Classes" which investigates understanding of word meanings and ability to see the links between words and also the ability to explain these links. His overall score is below the average range for his age.
Weschler Abbreviated Scales of Intelligence (WASI) (gives an indicator of non-verbal cognitive ability through block design and matrix completion tasks)	Percentile Rank: 35	XXXXX scored well within the average range in this assessment.
Test of Word Reading Efficiency (TOWRE) (assesses ability to read single real words and made up words)	Percentile Rank: 35	XXXXX scored well within the average range for this assessment.
Social cognition tasks (ability to see things from someone else's shoes) A series of short stories about social situations.	XXXXX's responses to these tasks indicate some difficulty understanding the stories at times, however his answers to some stories indicated some good understanding of how people might act in social situations.	

Please contact me if you would like to discuss these results.

Leila Mackie, Research Speech and Language Therapist

Contact: 0131 474 0000



Language Skills and Emotional Wellbeing in Primary School Boys

Participating pupil: _____

Dear Teacher

As part of the data collection for the above project we would be really grateful if you could complete the two attached questionnaires for the above child. We realise that you have many other priorities but the information from these is very important for us!

If you don't think the child has communication difficulties that is fine, just fill out the questionnaires as best you can. We have found that The Children's Communication Checklist-2 seems easy to misread, making the results invalid so please read the instructions carefully, particularly on page 3.

Please return them in the attached envelope (there is no need for a stamp). It would be great if you could return these in the next two weeks, but if this is not possible, we will still happily accept them later than this.

If you have any questions, please contact me on lmackie@gmu.ac.uk or give me a phone on 0131 474 0000.

Yours sincerely

Leila Mackie
Research Speech and Language Therapist

Centre for Integrated Healthcare Research
Queen Margaret University
Queen Margaret University Drive
Musselburgh
EH21 6UU

Code:

Date:

APPENDIX X

Language skills, emotional wellbeing and friendship in primary school boys

PARENT QUESTIONNAIRE

ABOUT YOUR FAMILY

1. **What kind of house/flat do you live in?**
(Please tick **only one box**)

council housing/housing association	<input type="checkbox"/> ₁
other rented accommodation	<input type="checkbox"/> ₂
privately-owned housing (i.e. own home/paying mortgage)	<input type="checkbox"/> ₃
temporary accommodation	<input type="checkbox"/> ₄

2. **Who lives at home?**

(Please tick **one box per line**)

	yes	no
Child's mother	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Child's father	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Child's step parent	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Other adult (state: _____)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Child's siblings Please state ages and gender:	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

_____ Other children	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
-------------------------	---------------------------------------	---------------------------------------

Please explain:

Code:

Date:

APPENDIX X

4. Please tell us if this child's mother is:
(Please tick **all that apply**)

- | | |
|---------------------------------------|---------------------------------------|
| in full time paid work | <input type="checkbox"/> ₁ |
| in part time paid work | <input type="checkbox"/> ₂ |
| in full time housework | <input type="checkbox"/> ₃ |
| income support | <input type="checkbox"/> ₄ |
| a student | <input type="checkbox"/> ₅ |
| sick/disabled | <input type="checkbox"/> ₆ |
| retired | <input type="checkbox"/> ₇ |
| not sure | <input type="checkbox"/> ₈ |
| doesn't have a mother/female guardian | <input type="checkbox"/> |

5. Did this child's mother:

(Please tick **one box per line**)

- | | yes | no | don't know |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| a) leave school at 16 (or younger)? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) get any
'Highers' ('H' grades)/'A' levels? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) go to college/university? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) get a degree? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) do an apprenticeship/has a trade
(City & Guilds) | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| f) get any advanced qualification - not a
degree (eg HND, nursing, teaching
diploma)? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Code:

Date:

APPENDIX X

6. Please tell us if this child's father/male guardian is:
(Please tick *all that apply*)

- | | |
|---------------------------------------|---------------------------------------|
| in full time paid work | <input type="checkbox"/> ₁ |
| in part time paid work | <input type="checkbox"/> ₂ |
| in full time housework | <input type="checkbox"/> ₃ |
| income support | <input type="checkbox"/> ₄ |
| a student | <input type="checkbox"/> ₅ |
| sick/disabled | <input type="checkbox"/> ₆ |
| retired | <input type="checkbox"/> ₇ |
| not sure | <input type="checkbox"/> ₈ |
| doesn't have a father / male guardian | <input type="checkbox"/> ₉ |

7. Did this child's father/male guardian:

(Please tick *one box per line*)

- | | yes | no | don't know |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| a) leave school at 16 (or younger)? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) get any
'Highers' ('H' grades)/'A' levels? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) go to college/university? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) get a degree? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) do an apprenticeship/has a trade
(City & Guilds) | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| f) get any advanced qualification - not a
degree (eg HND, nursing, teaching
diploma)? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Code:

Date:

APPENDIX X

ABOUT YOUR CHILD

8. Has your child been identified as having:

(Please tick one box per line)

	yes	no	don't know
a) Speech and language difficulties	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
If yes, at what age identified _____			
b) Dyslexia	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
If yes, at what age identified _____			
c) ADHD	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
If yes, at what age identified _____			
d) Autism or an autism spectrum disorder	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
If yes, at what age identified _____			
e) Emotional issues such as anxiety, depression	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
If yes, at what age identified _____			
f) other diagnosis	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
Please state _____			
If yes, at what age identified _____			

9. Speech and Language Therapy involvement:

(Please tick one box per line)

	yes	no	don't know
a) Has your child ever been referred to Speech and Language Therapy?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

Code:

Date:

APPENDIX X

b) Does your child still receive Speech and Language Therapy input?

☐ ₁☐ ₂☐ ₃

c) If yes, where does this take place:
(please tick only one box)

School based

☐ ₁

Health Centre based

☐ ₂

d) If your child no longer receives Speech and Language Therapy input, why not?
(please tick only one box)

Input completed, therapist discharged child

☐ ₁

Stopped attending sessions

☐ ₂

Moved away from area

☐ ₃

Other reason, State: _____

☐ ₄

Don't know

☐ ₅

10. What do you think is your child's main area of difficulty (if any)?

Thank you very much for your time!

Research report in the International Journal of Language and Communication Disorders

Pragmatic Language and the child with emotional/behavioural difficulties: A pilot study exploring the interaction between behaviour and communication disability

**Mackie, L & Law, J (2010)
(first published online, September 2009)**

This article can be found online using the link below:

<http://informahealthcare.com/toc/lcd/45/4>